FIRST PRINTING
December 1994

©1989-1994 Strata Incorporated. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means–electronic, mechanical or otherwise–without the prior written approval of Strata Inc.

ACKNOWLEDGMENTS:
Strata Inc. acknowledges with gratitude the contributions of its development team, which produced the software described in this document.

Strata Incorporated

2 West St. George Blvd. • Ancestor Square, Suite 2100
St. George, Utah 84770 • (801) 628-5218

Technical Services (801) 628-9751
FAX (801) 628-9756

Copyright Notice

©Copyright 1994 Strata Incorporated. All rights reserved.

This manual and the software described in it are furnished under license and may only be used or copied in accordance with the terms of such license. The information in this manual is furnished for informational use only. Its contents and the product it describes are subject to change without notice and should not be construed as a commitment by Strata Inc. Further, Strata Inc. assumes no responsibility or liability for any errors or inaccuracies that may appear herein.

Except as permitted under such license, no part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means–electronic, mechanical or otherwise–without the prior written approval of Strata Inc.

In addition, any image, model, or texture file provided in this software package may be protected under copyright laws. The inclusion of such material into new work could be a violation of the author's rights. You are responsible for obtaining any permission required from such authors.

INTRODUCTION

Welcome to the exciting world of three dimensional computer graphics and thank you for choosing StrataVision 3d. We at Strata Incorporated are continually striving to produce the best software possible to ensure your experience in the 3-D environment is productive, profitable, and enjoyable.

Before we begin, it is important that you know how to work in the Macintosh environment. If this is your first time using a Macintosh computer, or if you are only vaguely familiar with Macintosh operations, you may want to get out your Macintosh Owner Manual and review the functions of your computer. A good working knowledge of your hardware will make your experience using Vision 3d, or any other software you may have, a much more enjoyable one.

Yes, Vision 3d is a complicated software package that will challenge both you and your computer. However, the interfaces you will encounter in Vision 3d have been designed in true Macintosh fashion to be as user friendly as possible. The result is a powerful, intuitive application that puts you in command of the endless possibilities of 3D modeling with easy-to-use controls.

This manual is designed to provide you with the basics of Vision 3d with the same *user friendly* attitude as your Macintosh computer. As you progress beyond this manual, which you will do very quickly, the root skills you learn here should provide a solid foundation in Vision.

While that inevitably means this manual will most likely end up tucked away on the *forsaken user manual shelf* collecting dust after one reading, the author will sleep well knowing this bit of work will have launched countless enthusiasts and professionals into the exciting domain of Vision 3d. When you have mastered the basic tools outlined in this Getting Starting manual you will be ready to move on to more enthusiastic projects.

Now that we have taken care of the traditional introductory statements, lets have some fun exploring three dimensional space as seen through the Vision 3d software package. We will start this trek by examining some of the essentials of 3D computer graphics and how Vision is used to create 3D models. When we are finished

building our model, you will be ready to tackle your own projects with confidence in your skills and in the software.

The following Anniversary Clock illustration is presented here to tantalize your curiosity for the adventure you are about to embark upon.

This clock is the model you will be building during this Getting Started tutorial and shows not only the power of Vision's modeling tools, but the impact of Vision's photo realistic rendering magic.

TABLE OF CONTENTS

INTRODUCTION I
PHASE ONE: THE BASICS
The modeling window 1
Vision 3d tools and buttons 2
Tool palette 2
Button bar 3
PHASE TWO: MODELING
Working in Vision 3d 5
Create a New Shape workspace. 5
Faceting 7
Using the 3D Sculpter 9
Importing graphics 12
Extrude modeler 13
Creating a 2D object 17
Using the 2D Sculpter 18
Adding textures 22
Moving object Origin Point and center the hand. 28
Creating textures from imported graphics 32
Changing the texture map settings 35
Taking a snapshot 36
Using the Lathe modeler 40
Creating a skinned FlexObject™ 41
Assembling shape instances in the modeling window 52
Lathing multiple objects 56
Editing textures 59
More about Render an image. 60
PHASE THREE: ANIMATION
Adding motion to your model 66
Establishing the animation length and frame rate 66
Adding an animation script 67
Rendering an animation. 70

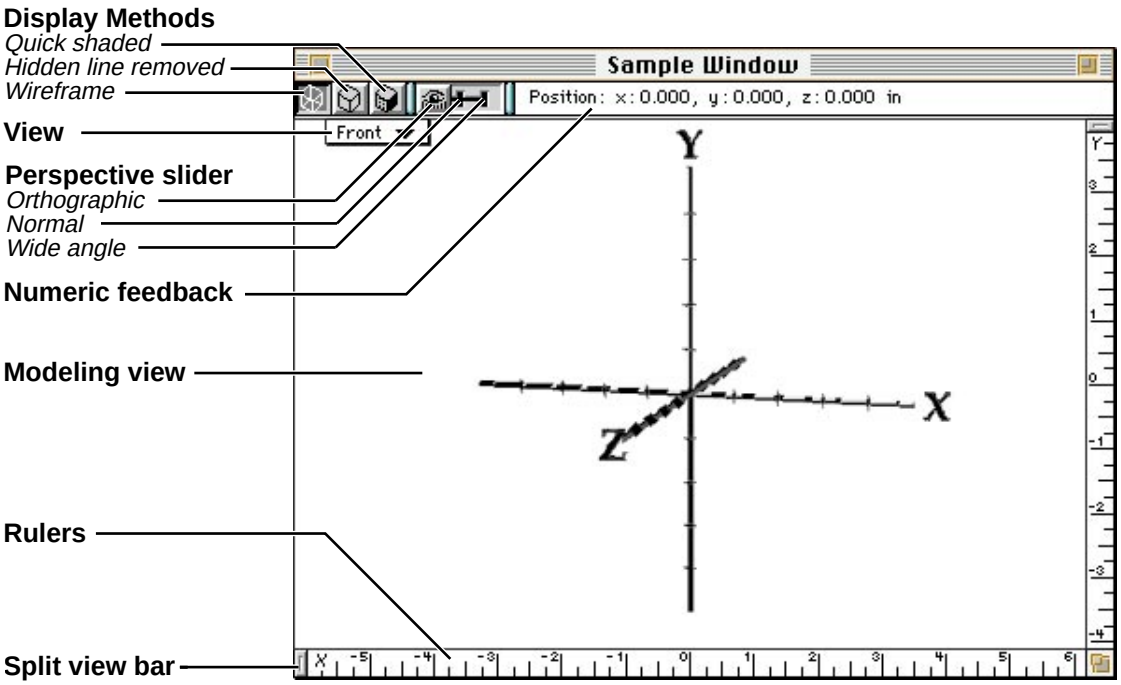
PHASE ONE: THE BASICS

The first thing you should know is that, like the real universe, Strata's 3D space is limitless in size. That means you can actually work in true scale, even if you are building a model of our solar system. Of course, your monitor will probably not display the entire model when you are viewing actual size and printing a hard copy of the model in one-to-one scale may be somewhat impractical. Nonetheless, you can build the scene as though it were real size.

The modeling window

While Vision's modeling window may look flat when you first open it, the window is actually a porthole to 3D space. You will be able to see a two-dimensional representation of depth and perspective in the window as you begin adding objects.

Vision 3d uses a set of three coordinates to keep track of where in space each object is located. These coordinates are simply measurements from center space along the X, Y, and Z axis.



As the previous illustration suggests, the **X** axis measures horizontal position, the **Y** axis measures vertical position, and the **Z** axis measures depth.

You can position objects in space by dragging them with Vision's Move tool or by entering exact coordinates through the Transform dialog. We will look at both these methods a little later.

The main modeling window is the window that appears when you create a new model or open a saved model. You should also be aware of shape windows which may be present in a model.

A shape window looks the same as the main window but is a separate workspace where you can create any object, then insert it into the main window. The shape window becomes the parent in the hierarchy and the inserted instance of the shape takes on the role of the child object. Changes made to an object in the shape window is instantly reflected in the object's child instance.

For example, changing an object's texture in its parental shape window will change the texture on the child object in the main modeling window. This hierarchical order can be carried over several shape windows until the element is complete and placed in the main modeling window as part of the total model. The parent/child relationship will be discussed more as we move through the tutorials in this manual.

Vision 3d tools and buttons

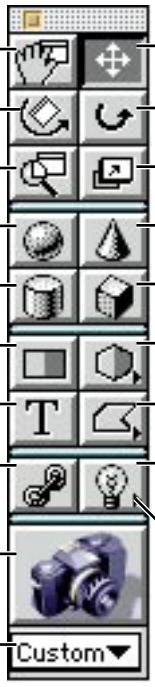
As with almost any job you undertake, the quality of your work increases when you have the right tools. Creating 3D computer graphics is no different, and Vision boasts some of the best 3D modeling tools available.

Tool palette

The Tool palette, located along the left side of the modeling window, contains the tools you will use to move and rotate objects, draw two-and-three-dimensional objects, link objects, add lighting sources to your model, and begin a rendering.

Some of the tools, such as the movement and 2D drawing tools, are similar to those used in draw and paint programs. Others may be new to you if this is your first time working in a 3D environment.

A brief overview of what each tool is used for will familiarize you with the functions and help ease any apprehension you may have about your first trek into Vision's 3D universe.



View Move tool
moves viewing window's center point

View Rotate tool
rotates viewing window

Magnifying Glass
increase-decrease view size

Sphere Primitive tool
draws 3D sphere

Cylinder Primitive tool
draws 3D cylinder shapes

Rectangle tool
draws filled-unfilled 2D rectangles

Text tool
prompts text dialog

Link tool
links objects

Camera tool
starts rendering process

Rendering Options pull-down menu
easy access to rendering options

Move tool
moves objects

Rotate tool
rotates objects

Scale tool
alters object scale by dragging handles

Cone Primitive tool
draws 3D cone shape

Cube Primitive tool
draws 3D cube shapes

Oval tool
draws filled-unfilled 2D ovals

Polyline tool
draws open-closed 2D lines

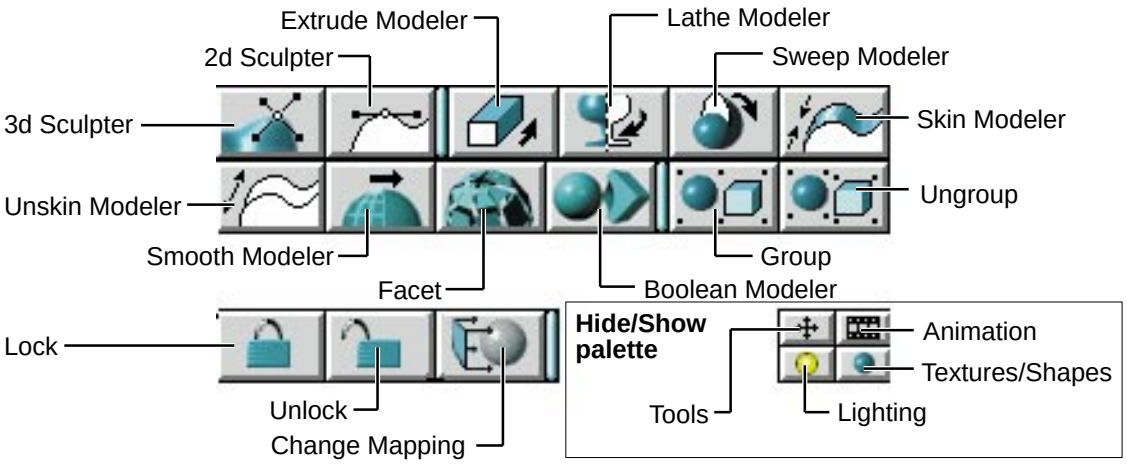
Lighting tool
adds spot-ambient light sources

Pop-out menus are indicated by small arrows in the icon and provide additional tool selections.

Button bar

The button bar runs along the top of the modeling window and provides quick access to Vision's powerful modeling extensions. A simple click on one of the buttons and you're ready to go to work in a new modeling environment. If a button is grayed or dim, that modeler is not available for your current selection.

The Hide / Show buttons allow you to hide or display the tool, animation, lighting, and texture / shape palettes. By default, all but the animation palette should be displayed when you launch Vision 3d for the first time. You can toggle these displays by clicking on the open / close box in the upper left corner of each palette or by clicking on the appropriate Hide / Show button. We will discuss each of these palettes later.



Tutorial examples in this manual will give you basic skills in Vision's tools and modeling extensions. As you build on these skills you will inevitably need more information on the more complex workings of Vision's modelers. This information can be found in the user reference manuals included in the Vision 3d package. For now, however, we will stick to the basics.

You should keep in mind that some of the techniques used in this Getting Started Tutorial are designed to introduce you to various modeling extensions and application functions and may not be the most efficient or effective methods for achieving the results you want. However, because our goal here is to provide you with skills in as many aspects of Vision 3d as possible, you should go along with the instructions in this tutorial. You can, of course, always go back and improve the model as your knowledge builds and your talents sharpen.

PHASE TWO: MODELING

With the preliminary function explanations out of the way, it is time to get started modeling in Vision's 3D space. For the remainder of this manual we will explore the basic functions of the Vision 3d package in step-by-step tutorials, each building on the one before. When you have finished with this manual, you will have completed an entire model and learned how to add a simple animation script to the project.

HINT *While you always have the freedom to make your own variations to the tutorial instructions, it is suggested that you keep the variations minor and that you do not omit any of the tutorial sessions.*

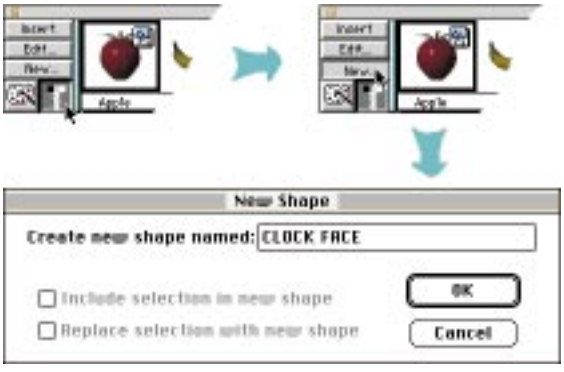
Throughout our tutorial sessions we will be using many of Vision's modelers and tools to build an anniversary clock. If you make a mistake along the way, don't panic. The *Undo* command is available through the Edit menu, but it must be used immediately after the action you want to undo. Otherwise, the *Undo* command will be dim and not available.

Working in Vision 3d

The first step in building our anniversary clock model will be constructing the clock face. We will use a cylinder primitive for this and make some adjustments in Vision's 3d Sculpter.

1. **With a new model window open, create a New Shape workspace.**

To create a new workspace, click on the bolt icon in the Texture/ Shape palette to toggle to the shapes library. Click on the New button to bring up the New Shape dialog box. Name the new shape CLOCK FACE and click OK.



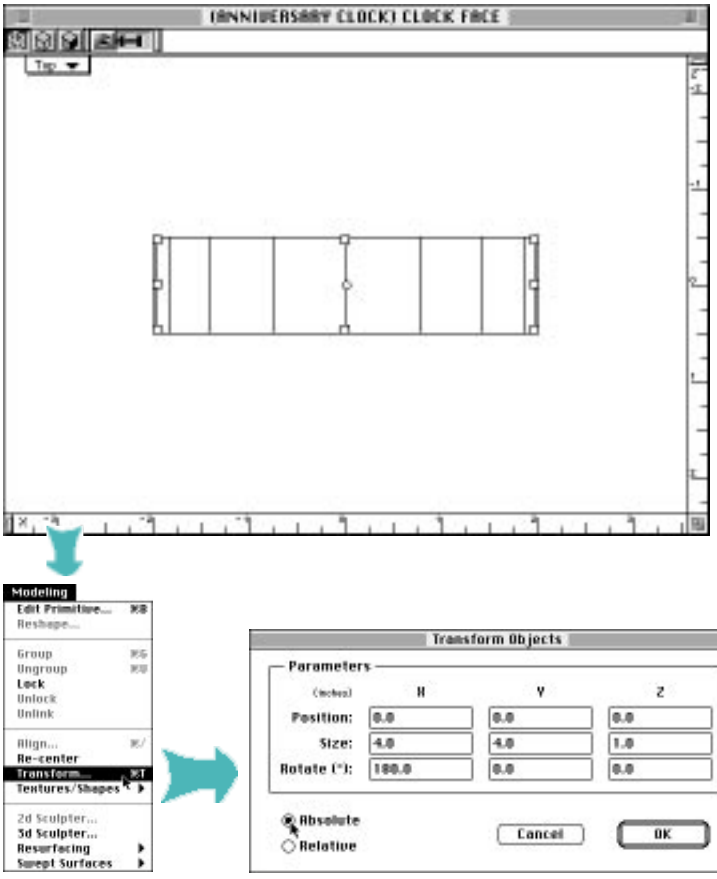
This new workspace is where we will build the face of the clock. The shape created in this workspace will be the parent object as described earlier in the discussion about shape hierarchy. Later, we will include a child *instance* of this shape with others in the main modeling window to create the complete model.

You will notice the shape workspace looks the same as the main modeling window and that the workspace has the same functionality as the main window. You can even render from the shape window just as in the main window. The primary difference between a shape workspace and the main modeling window is in the hierarchical relationship.

2. Change the view orientation of the shape workspace to Top and insert a cylinder primitive.

With the cylinder primitive tool selected, drag a four-inch-long, one-inch-tall marquee in the workspace window.

Check the size and position of the primitive by choosing the Transform command in the Modeling menu and ensuring the field settings match those in this illustration.



When the settings are right, click OK.

HINT

Ensuring the object is centered in space along the X, Y, and Z axes will prove an important step later in this tutorial. You may want to carry this centering technique on with other models you build to make sure objects are properly and easily positioned.

While the cylinder is selected, choose the *Edit Primitive* command from the Modeling menu and change the Cone / Cylinder Order from Auto to 6. This will increase the number of facets in the shape to create a smoother, more rounded object. Ensure the *Solid object with capped ends* checkbox is checked and click OK.

Save ⌘S

Save the model as ANNIVERSARY CLOCK. You should save your model at the successful completion of every major task. That way, if you make a mistake in the next step you can revert to your saved copy with a minimum of lost time and effort.

Switch the view orientation back to Front. You should see a circle in the center of the workspace window. No perspective of the cylinder will be visible at this point because the lens is set to Orthographic. It is often easier to maintain this lens setting while you are modeling. When you are ready to render you will want to change the setting to get a realistic perspective of your model.

However, if curiosity is getting the best of you, **make sure you have saved this file** and try changing the view orientation to Isometric. You may also want to experiment with the lens setting and display methods. Just remember to return the settings to Orthographic and Wireframe and switch back to the Front view before moving on to the next step of this tutorial.

HINT

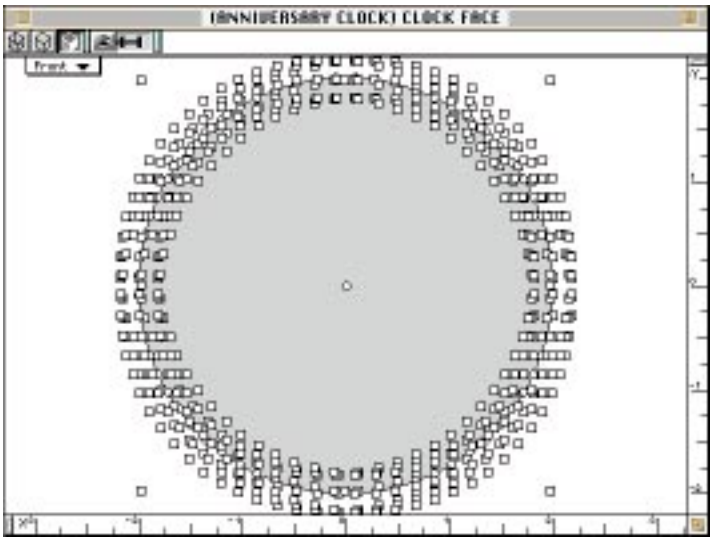
If you inadvertently change the model and can not perform the Undo command, you can return to the version you saved prior to your exploratory venture of the views by using the Revert to Saved command in the File menu. This will close the file you are working on and replace it with the last copy you saved.

3. Facet the cylinder to separate the clock face from the main body of the timepiece.

Faceting an object breaks it into individual polygons, allowing you to manipulate each separately. To facet the cylinder, make sure it is selected in the workspace and click on the Facet modeler button in the button bar. The modeler performs the function automatically, so the only interface you will see is a progress dialog showing the function is taking place. When the faceting is complete, the cylinder will be broken into numerous polygons.

For the next step of this operation, make sure the view is set to Front and switch to the Quickshade display method.

This will help you discern which polygon you are selecting in the next segment of the tutorial.

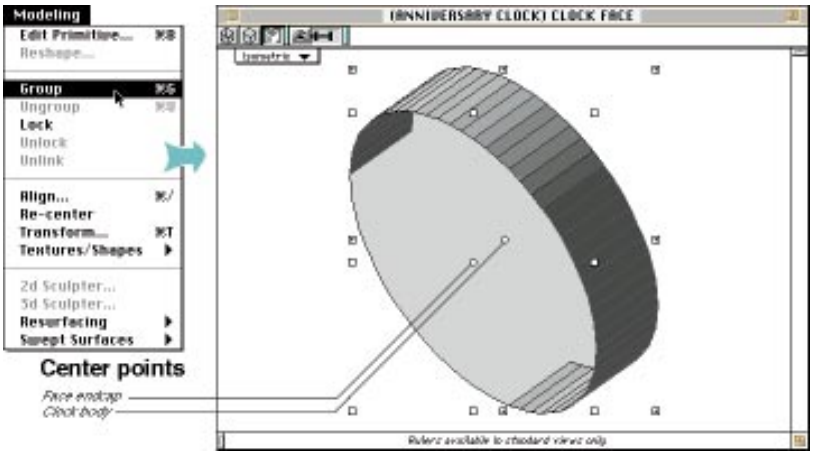


4. Deselect the front endcap from the rest of the cylinder's polygons and group the clock body back together.

This is a lot simpler than it sounds. You may want to perform a *Select All* command from the Edit menu's Selection sub menu before you proceed to ensure you have all the polygons in the model selected. Then, while in the front view, hold the Shift key down and click on the frontmost polygon (the face endcap) of the cylinder with the General Move tool. This will deselect the clock face.

Now, with all the polygons except the face endcap selected, choose the *Group* command from the Modeling menu. This will group all the polygons in the clock body back together.

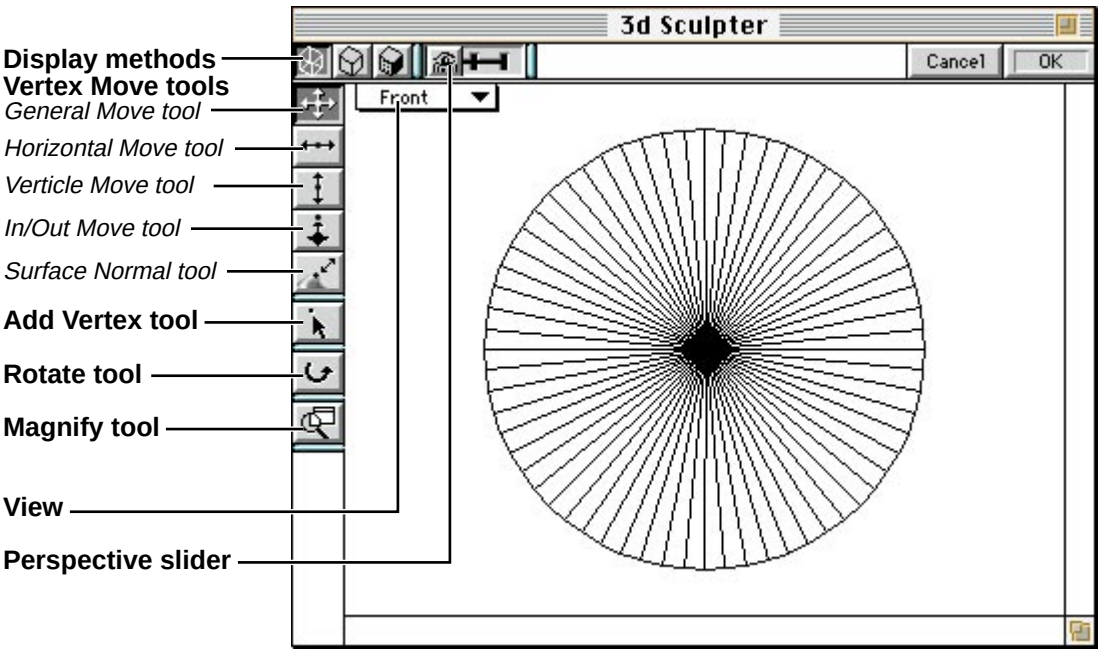
This Isometric view with all objects selected shows the center points of two separate shapes in the workspace after the Group function is complete–the face endcap and the main clock body.



5. With the view set to Front and the main clock body selected, open the 3D Sculpter and give the back cover a convex curve.

With *only* the clock body selected (the section you just grouped in the last step), click on the 3D Sculpter button in the button bar. The object will be displayed in the modeler's window in the Front view.

The following illustration shows you the tools available in the 3D Sculpter. You can use this illustration as an information guide while working in the 3D Sculpter.

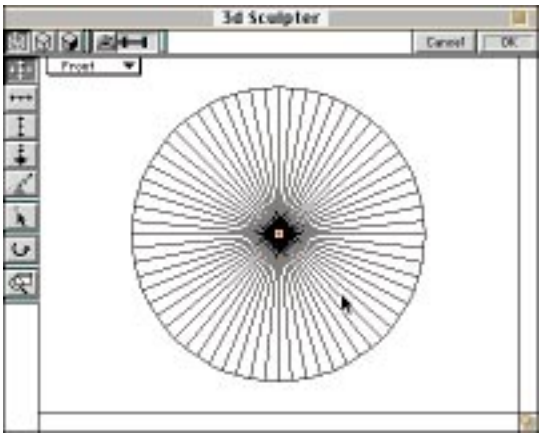


HINT

An illustration showing the tools in each of the modelers will be presented when that modeling extension is discussed. The illustrations should serve as a pilot to the functions of the modeler. For more detailed descriptions of how each tool works within its modeler, please refer to your Reference Manual.

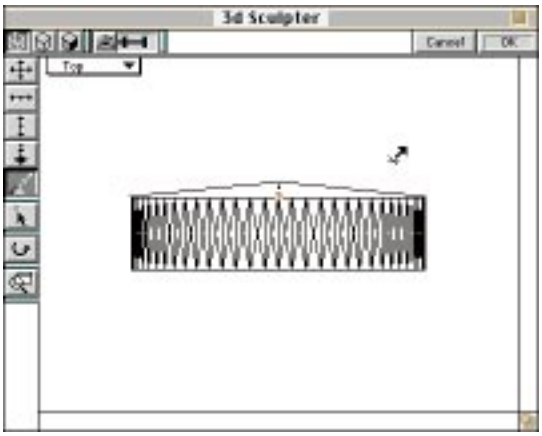
Select the Surface Normal Move tool and drag a marquee around the center point of the cylinder while in the Wireframe display.

Dragging a marquee over an area of the shape while in the Wireframe display mode will select all the points inside the marquee. In our model, only the center point of the cylinder's back endcap will be selected.



Switch to the Top view to see the selected point, which will be accented in red on color monitors. While in the Top view, click and drag the center point with the Surface Normal Move tool, pulling the point up and to the right.

Notice how the endcap moves outward from the cylinder when you drag the center point to the right, and inward as you move the mouse to the left.

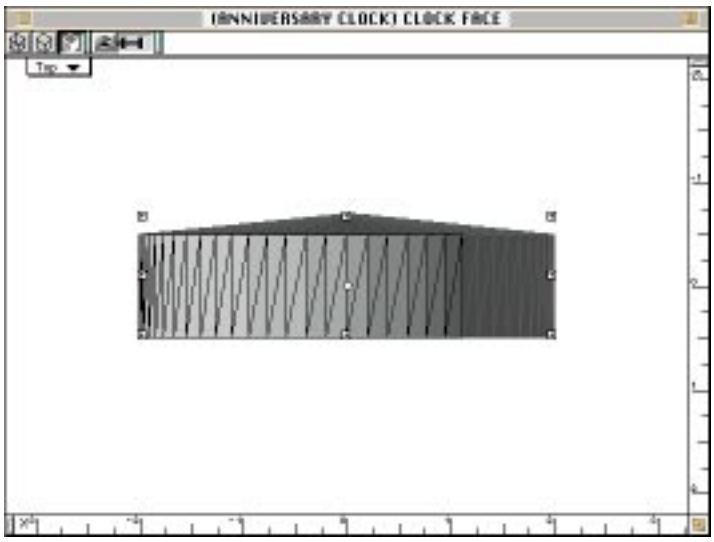


HINT

If more than one point on an object is selected, dragging one of the selected points in one direction with the Surface Normal Move tool would force the points away from each other. Moving the mouse in the opposite direction would drive the points together.

Drag the center point slightly outward from its original position to create a bulge in the endcap. This will give the back of the clock a convex surface.

When you are satisfied with the curve of the endcap, simply click OK to make the change permanent and return you to the modeling workspace.



The changes you made to the cylinder in the 3D Sculpter will be carried over to the modeling window. You can see the changes to this model when viewing the shape in the Top view.

You may notice the object's center point has moved from the exact center of the cylinder in relation to its overall size after using the 3D Sculpter. Choosing the *Re-center* command in the Modeling menu will place the center point at the new center of mass.

Using the Re-center command positions an object's center point at center mass. You can perform this action on a single or grouped object.

6. Move the clock's face plate so it fits just inside the clock body.

Select the clock's front plate and choose the *Transform* command from the Modeling menu. When the dialog appears set the radio

button to Absolute and subtract 0.04 inches from the Z axis Position entry.

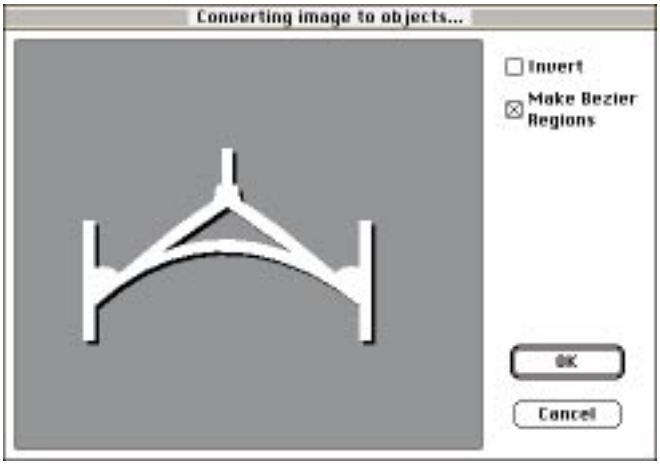
For example, if the clock's face plate is positioned at 0.50 on the Z axis, you should change the Z axis entry to 0.46. If the Z axis indicates the face plate is positioned at -0.50, you should change that field to -0.54. Enter the results in the Z axis Position field and click OK.

This will inset the clock's face plate slightly inside the clock body, which will give the affect of a rim around the face in the final rendered image.

7. In the Front view, import the graphic in the Tutorial files named CROWN.

Choose the *Import* command from the File menu and open the graphic file named CROWN. The file should be in the Tutorial folder included with the Vision 3d software package.

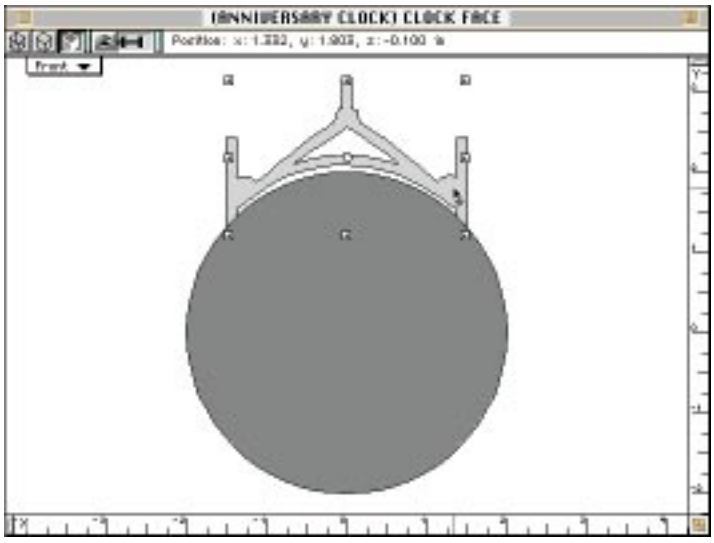
When the Import command's dialog appears, ensure the Make Bezier Regions checkbox is selected and click OK.



The *Import* command converts an image made in a draw or paint program into a two dimensional object that can be manipulated in Vision 3d. You can use almost any draw or paint program to create your own images. More information on this process is available in the Reference Manual.

Click in the workspace window when the converted object is loaded to place the clock's decorative crown piece in the workspace.

Move the crown so it sits directly above the clock body by dragging it with the General Move tool.



8. Extrude the CROWN to make a 3D object.

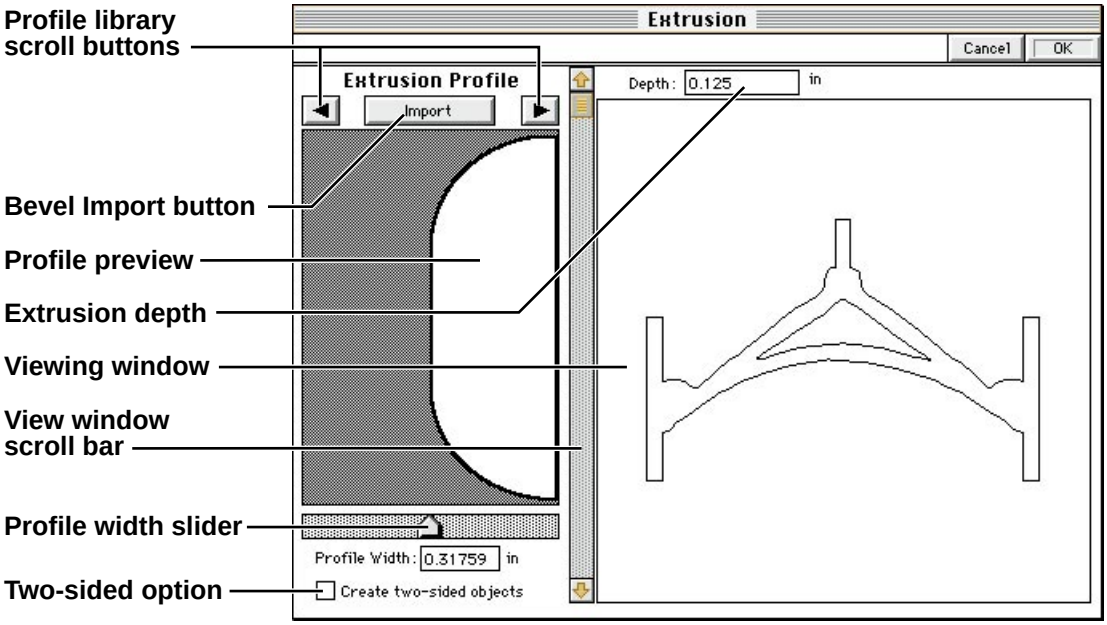
At this point, the crown is a two dimensional object without depth. To add the missing third dimension to the crown, you must first ungroup it by choosing the *Ungroup* command in the Modeling menu.

A warning dialog will appear when you choose the Ungroup command. In this case, click on the Ungroup button to perform the function.

The selection includes references to Shape objects. Ungrouping these objects will cause references to be replaced by actual data, possibly enlarging the database. Do you really want to do this?
Ungroup
Don't

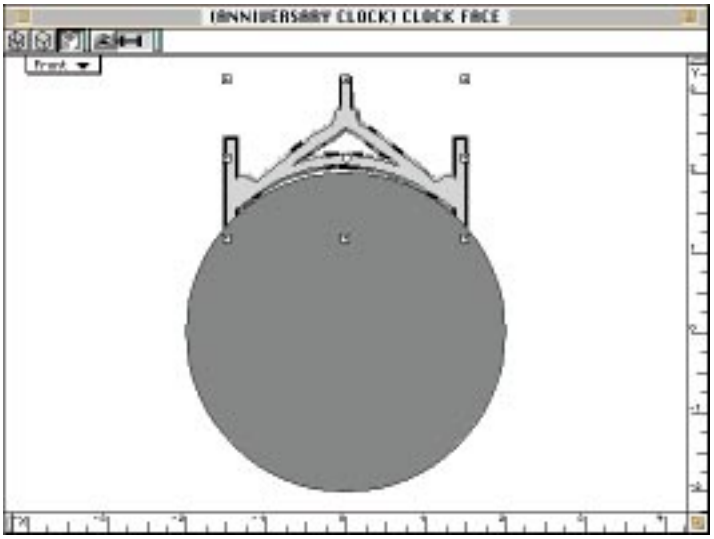
As you would expect, clicking the warning dialog's Don't button will leave the shape untouched.

With the crown still selected, click on the Extrude button. When the Extrude modeler's dialog appears, a preview of the CROWN shape will be in the modeler's dialog.



Scroll through the available beveled edges in the modeler's Extrusion Profile window until you find the double-curved bevel, set the Depth field to 0.125 inches, and click OK. The modeler's progress dialog will appear while the calculations are being performed.

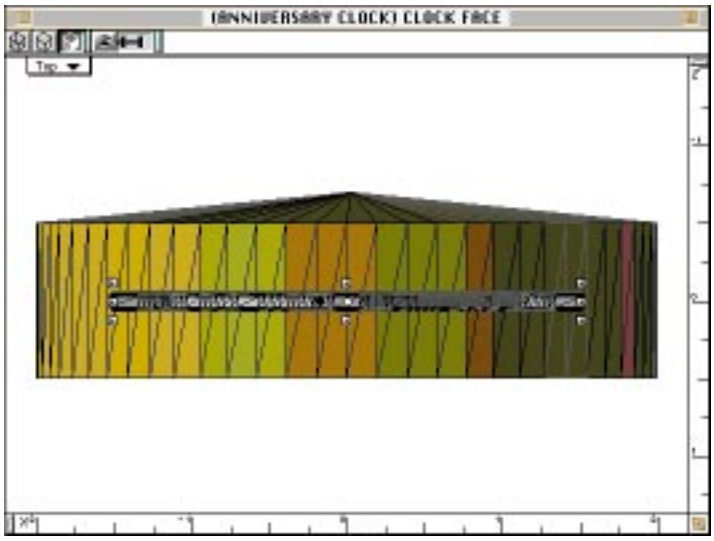
You will be returned to the workspace window when the Extrude modeler is finished, and a new 3D shape with rounded edges will appear on your screen in the same position the imported 2D object was prior to the operation.



9. Switch to the Top view in the workspace window and center the decorative crown on the clock body.

From the Top view you can move the crown along the Z axis to position it in the center of the clock's body.

Use a constrained drag by holding down the Shift key once you have started moving the object. This will ensure you do not move the crown off center along the X axis .



HINT

*You can constrain movements to horizontal, vertical, and 45 degree angles by holding down the Shift key while dragging objects. However, **you must have the mouse button depressed prior to pressing the Shift key.** This is an important distinction to remember. You can also constrain movement by dragging objects by their handles. Please refer to the reference manuals for more information on this method of constraining movement.*

Save ⌘S

Switch back to the Front view and Save your model. Make sure you have deselected all the objects in the workspace by clicking in the window with the General Move tool and, if the modeled objects extend beyond the window frame, use the *Fit Views to All* command in the Windows menu to resize your model so all its parts are visible. Close the shape workspace by clicking the close box in the upper left corner or by choosing Close in the File menu.

10. Create a New Shape and name the workspace BIGHAND.

Vision 3d generally allows you several ways to perform certain tasks. This is because people like to do things in ways they feel comfortable with, and not everyone feels comfortable doing things

the same way as their neighbor. To help you become acquainted with some of these options, we will present various methods of performing the same task throughout this Getting Started tutorial.

You will remember we used the New button on the Textures / Shapes palette to create the last workspace. This time we will use the main menu commands. Both methods achieve the same results.

Pull-down the main Modeling menu and choose the *Browse Shapes* command from the Textures / Shapes sub menu. This will open a dialog that lists all the shapes currently loaded in the active model. You should see two entries–CLOCK FACE and CROWN. As you can see, there are a number of options you can choose from this dialog, all of which are discussed in the main Reference Manual.

For this phase of the tutorial, click on the New button to create a new shape workspace. Name the new workspace BIGHAND when the dialog appears and click OK. You will be returned to the Shape Browser dialog where the new shape is listed. With BIGHAND selected in the window, click on the Edit button to open the workspace.

HINT

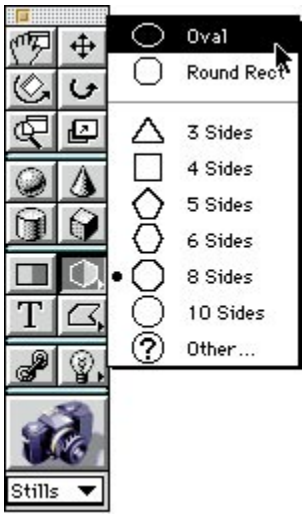
If you close the shape workspace for any reason and need to return to that window to edit the model on that hierarchical level, simply select the shape in the Shapes palette by clicking on its preview icon once and click the Edit button on the left side of the palette. The Edit button allows you to open and make changes to all shapes in the Shapes palette. You can have as many shape windows open at one time as your machine's memory will allow.

Make sure the New Shape workspace reflects actual measurements by selecting the Actual Size View command from the Windows menu.

11. Build a 2D object to form the clock's minute hand using the Regular Polygon and Polyline tools.

With the new workspace set in the Front view, select the filled Oval tool from the Regular Polygon pop-out sub menu.

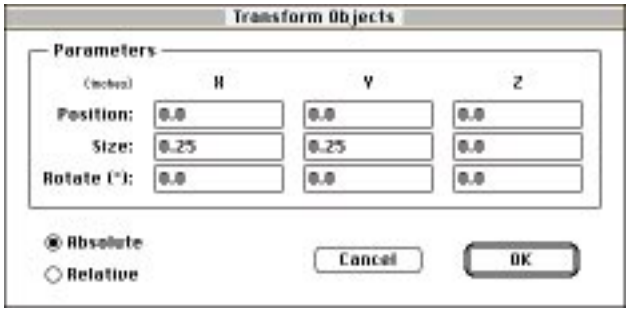
Most of the 2D modeling tools allow you to choose whether the object you build is filled or unfilled. Clicking on the appropriate side of the tool's icon sets the tool to one of these options. The shaded side of the icon represents a filled object.



Hold the Shift key down to constrain the oval to a perfect circle and click-and-drag a quarter inch circle in the workspace. In this case, unlike the movement constraining key, hold the Shift key down *before* starting to draw the 2D object to constrain the tool's operation.

The circle will appear as a small diamond on your screen. Don't panic, this is correct.

Use the Transform command in the Modeling menu to position the circle at center space and make sure the object measures exactly 0.25 inches in diameter.

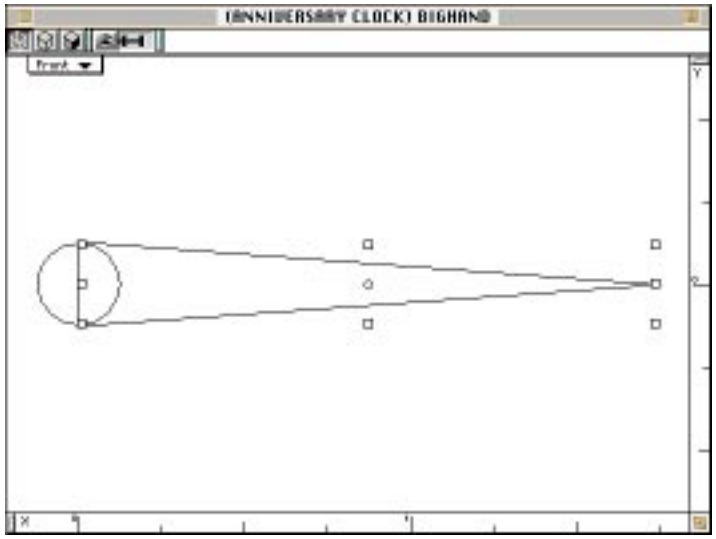


Now select the filled, Closed Polyline tool from the Tool palette and draw a triangular-shaped object that measures 0.25 inches tall by 1.75 inches long. This will be the minute hand of the clock.

HINT

The Polyline tools automatically draw between anchor points you place by clicking with the mouse button. Double clicking will place the final anchor point and automatically draw a line between the first and last points to close the object (no line will be drawn between the first and last points when using the Open Polyline tool).

Choose the Fit Views to Window command (or use the Command-Equal (=) keystroke shortcut) to enlarge the objects to fill the workspace window for easier modeling.

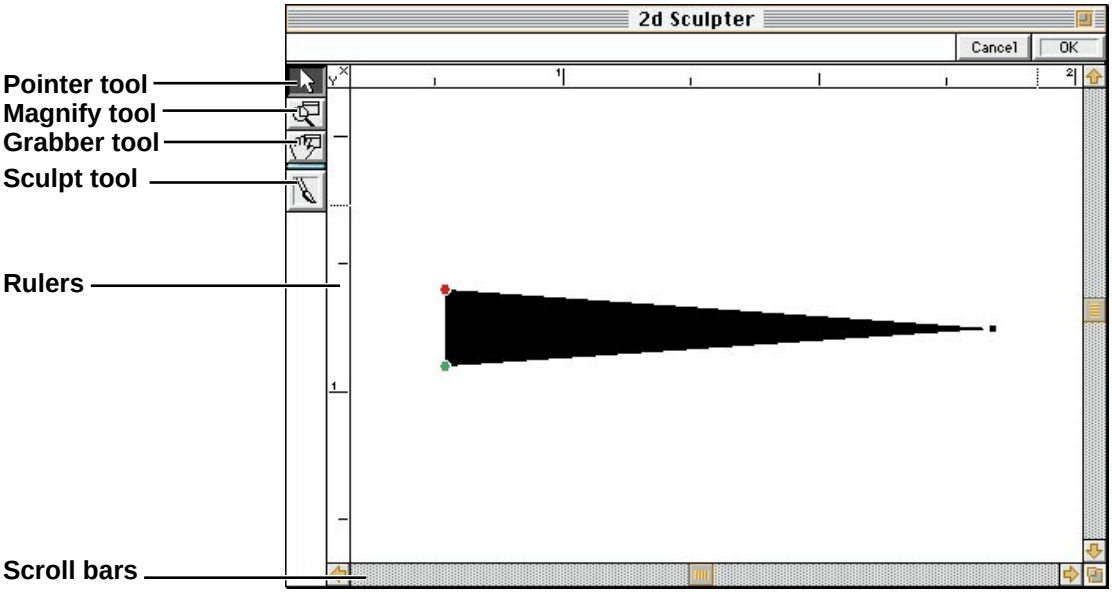


Save ⌘S

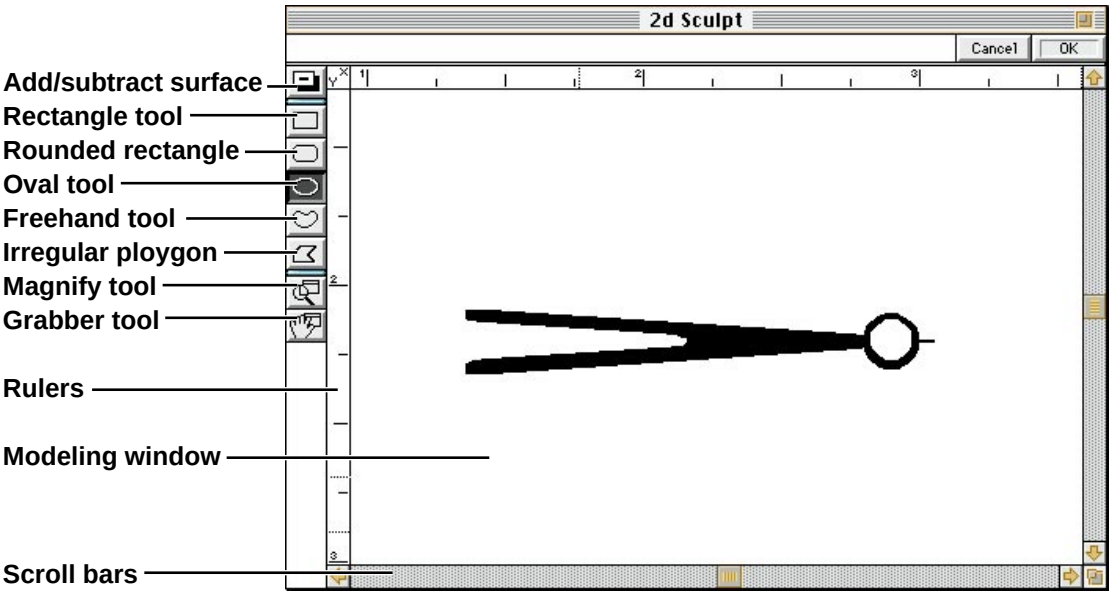
12. With the triangle shape selected, choose the 2D Sculpter and edit the object to create a more decorative hand for your clock.

The triangle-shaped hand will appear in the 2D Sculpter window as a black-filled object with three points designating the outline. The green and red points indicate starting and ending vertex points respectively.

From the 2D Sculpter window you can move the points to different locations and perform a variety of other functions described more fully in the Reference Manual. For this tutorial session, click on the Sculpt tool (the paintbrush icon) to move to the 2D Sculpt window.



Once you have opened the 2D Sculpt modeler (pictured below), use the scroll bars to position the object in the center of the window. You may notice the 2D Sculpt workspace works much like standard paint programs, allowing you to add and subtract surfaces to the object and perform other operations on two-dimensional objects.



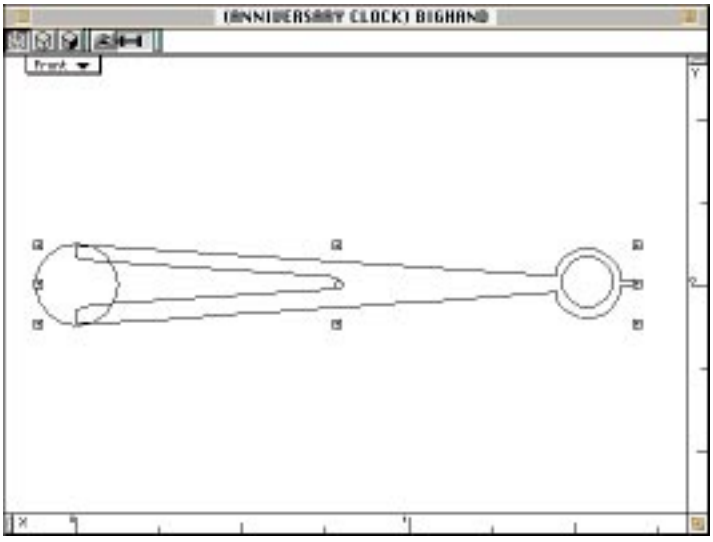
As you can see in the previous illustration, you can add a circular end piece to the clock's hand and punch a hole through its center by toggling the Add / Subtract Surface button. You can then subtract the center surface from the hand's main body using the Freehand tool.

When you have finished sculpting your clock hand (you can vary the design of your hand from the illustration, but do not increase the actual length or height of the object or it may not fit correctly when placed on the clock face), click on the OK button. You will be returned to the 2D Sculpter where, if needed, you can adjust vertex points. Click on the OK button when you are ready to return to Vision's workspace window.

Save ⌘S

You should have two, 2D shapes in the workspace window–a circle and the sculpted hand. Make sure the shapes are positioned correctly to form the hand of the clock. It would be a good idea to use the *Transform* command to ensure each object is located at the 0.0 coordinate on the Z axis. If they are lined up properly, you should only see a single line when you switch to the Top view in the workspace window.

When the objects are lined up and you have returned to the Front view, select both objects and group them together using the Group command.



13. Create a New Shape named SMALLHAND, which will include the grouped shape in the BIGHAND workspace.

This step will show you how easy it is to duplicate a shape without using the traditional Cut and Paste technique. It is important, however, that you follow each step in this process

carefully to avoid changing the hierarchical lineage of the shapes you are creating.

With the BIGHAND workspace still open and the grouped object selected, click on the New button in the Shape palette to create a new shape workspace. When the naming dialog appears you will notice the *Include selection in new shape* and *Replace selection with new shape* checkboxes are checked.

Uncheck the Replace selection with new shape box and name the shape SMALLHAND. The Include selection in new shape checkbox should remain checked. Click OK to proceed.

HINT *If you were to leave both checkboxes in the naming dialog checked, the new shape would become the parent for the BIGHAND shape. By unchecking the Replace selection with new shape box, the new shape merely includes a copy of the shape created in the BIGHAND workspace.*

Save ⌘S

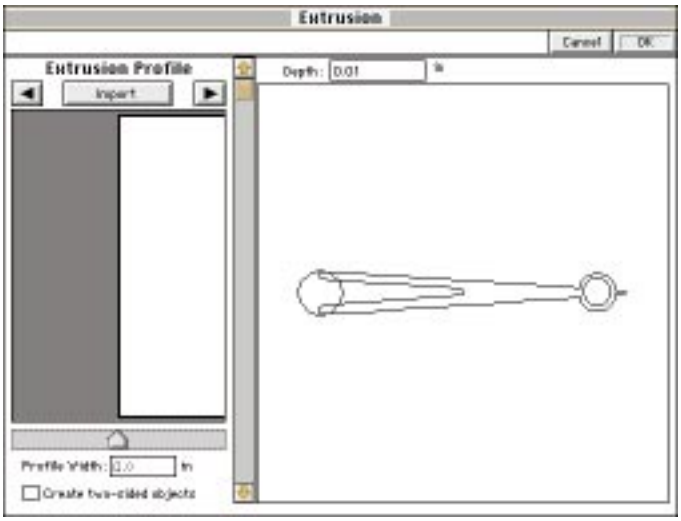
We are not ready to start working in the SMALLHAND workspace yet, but we needed to carry over the objects you created in the BIGHAND workspace before they were edited any further. For now, close the SMALLHAND window , which should make the BIGHAND workspace the active window.

HINT *You will notice a new or updated shape is placed in the Shapes palette each time you close one of the shape workspaces. A preview picture of any objects in that workspace will be shown in the palette when the workspace is closed. You should have four new shapes in the palette, each of which can be placed in a model window or opened by clicking on the Edit button when the shape's icon is selected.*

14. Extrude the grouped BIGHAND shape to create a 3D object.

With the grouped shape selected, click on the Extrude button to open the Extrude modeler.

Change the Extrusion Profile selection to the straight, squared bevel and set the Depth to 0.01 inches. When the settings are correct, click OK to extrude the object and return to the workspace window.



Save ⌘S

The clock's minute hand is now a three-dimensional object. If you switch to the Top or Isometric view you will see the object has depth as well as height and width.

15. Add a texture to the BIGHAND shape.

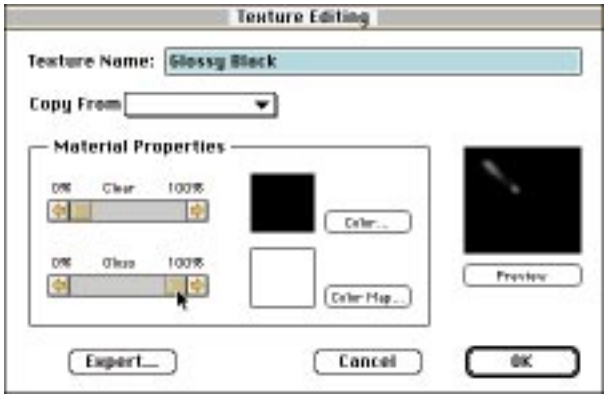
This should be the last time you need to work on this shape at the parent level, so now would be a good time to apply a texture to the object to give it a realistic color. A glossy black color would be best for the clock's hands, but there is no such texture in the Texture palette. So, we will make our own texture.

Never fear, making a simple color texture is an easy process in Vision. You can learn how to build more complex texture maps in the main Reference Manual. As your skills progress you will find the ability to build well-developed textures maps is one of Vision's most powerful tools.

The first thing you must do is switch the Shapes palette back to the Textures mode by clicking on the Texture Library button (the painter's palette) in the Textures / Shapes palette. The palette will redraw to display a variety of textures. Click on the New button to open the Texture Editing dialog.

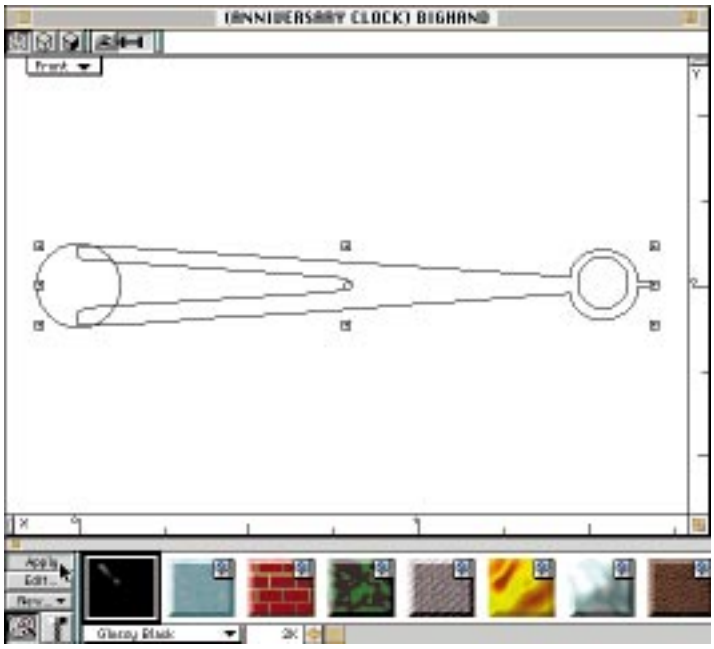
Give the new texture a name like Glossy Black and click on the Color button to open your system's currently installed color picker. Set the color picker to display solid black and click OK.

When you return to the Texture Editing dialog the selected color will be displayed in the small window next to the Color button.



Drag the Gloss slider bar to the far right position to give the color a high gloss finish. If you want to see the new texture before you leave the editor, click on the Preview button. Click OK to load the new texture and return to the modeling workspace.

The new texture will be displayed in the Texture palette. With the clock hand selected in the workspace window and the new Glossy Black texture selected in the Texture palette, click on the Texture palette's Apply button.



You should not notice a difference in the display while the view method set to Wireframe because the texture is black, which is the same as the Wireframe mode's display color. However, if you switch the view method to Shaded the object will be displayed with a black surface. Later in this tutorial you will apply a brass texture to an object, which will change the color of that shape's wireframe outline to approximate the texture color.

Save ⌘S

Close the BIGHAND shape window and switch the Textures / Shapes palette back to the Shapes library.

16. Use the 2D Sculpter to edit the SMALLHAND shape.

Locate the SMALLHAND shape in the Shapes palette and click on the Edit button to open the workspace window.

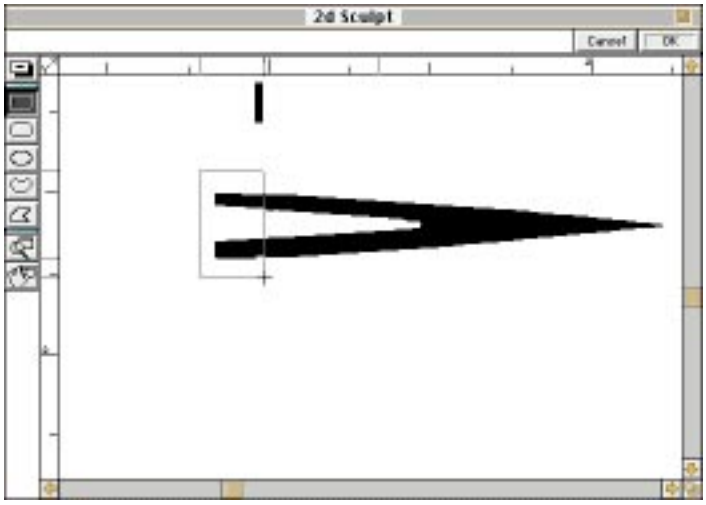
You must ungroup the object before you can pull the hour hand shape into the 2D Sculpter. This modeler will not accept grouped objects, even though each of the objects in a group are two dimensional.

This time, use the Ungroup button in Vision's button bar rather than the menu command to ungroup the objects.

With only the hand shape selected (you can deselect the circle by clicking on it while holding the Shift key down or click anywhere in the workspace to deselect all objects and reselect the hand), click on the 2D Sculpter button. As before, click on the 2D Sculpt button to progress to the next editing level in the modeler.

Use the same editing techniques to add and subtract surfaces as you did when sculpting the clock's minute hand, edit the hour hand to be smaller in length and less ornate (we took out the decorative circular at the end of the hand and trimmed the length by cutting roughly one quarter inch off the forked end and shaved the top and bottom sides to further shorten the hand).

When you are satisfied with the changes to the hour hand shape, click on the OK buttons in both the 2D Sculpt and 2D Sculpter modeler windows to return to the SMALLHAND workspace.



You will notice the hand is no longer touching the circle because you shortened the object. Move the hand toward the circle until it overlaps the circle like the minute hand did. Use the Shift key while you drag the object to constrain the movement horizontally.

17. Extrude the SMALLHAND shape.

When the two objects are properly aligned, select both and group the shapes using either the Group button or the Group command in the Modeling menu.

HINT

By now you should be getting familiar with both the button bar and menu commands used to perform various functions in Vision 3d. You are always free to use whichever method you are most comfortable with.

With the grouped object selected, click on the Extrude button to open the Extrude modeler. Set the Extrude parameters the same as with the BIGHAND shape–select the straight, squared Extrusion Profile bevel and set the Depth field to 0.01 inches. Click OK to perform the operation.

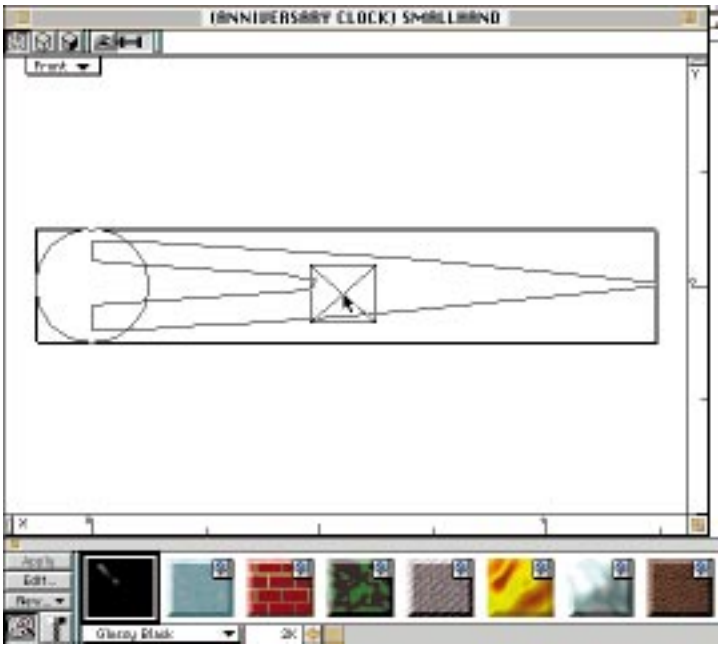
As with the BIGHAND shape, when the Extrude operation is complete the screen will redraw a three-dimensional object.

Save ⌘S

18. Apply the Glossy Black texture to the SMALLHAND shape.

Switch the Textures / Shapes palette back to the Texture mode. This time we will use the drag 'n' drop method for applying the texture to the hour hand.

Locate the Glossy Black texture on the Texture palette. Place your cursor on the texture icon and hold the mouse button down while you drag the mouse atop the hour hand shape in the workspace window. A heavy black line will appear around the shape when your mouse passes over it.



While the black frame is visible, release the mouse button to "drop" the texture onto the shape. This will apply the texture to the shape.

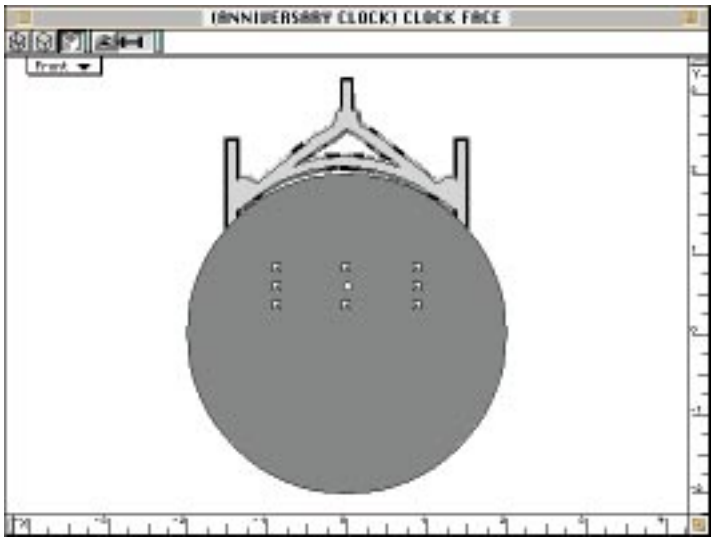
With the texture applied our work in this workspace is finished. Close the window to return to the main modeling window. Switch the Textures / Shapes palette back to the Shapes mode to proceed to the next step of this tutorial.

Save ⌘S

19. Insert the BIGHAND shape into the CLOCKFACE workspace.

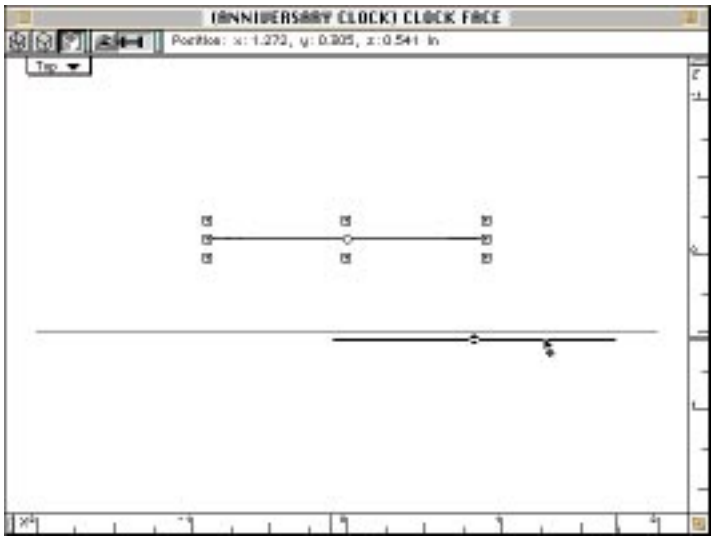
Open the CLOCK FACE workspace (select the CLOCK FACE in the Shapes palette and click Edit). Select the BIGHAND shape from the Shapes palette and click the Insert button to place a "child" instance of the minute hand into the CLOCK FACE workspace.

The minute hand instance will be inserted at center space in the model. This should put it in the middle of the clock, making it difficult to move because it is surrounded by other shapes. But never fear, Vision lets you hide objects to make modeling in tight places easier.



Deselect the minute hand, then select the clock body and decorative crown by switching to the Top view and clicking on each object with the Shift key depressed. It will be helpful to set the display method to Shaded. Then, choose the *Hide Selected* command from the Selection sub menu of the Edit menu. The selected objects will disappear from your screen leaving only two lines–the minute hand and the clock's face plate.

Using the General Move tool, drag the minute hand slightly in front of the clock's face plate and offset from center. The exact position is not crucial at this point.



Now switch back to the Front view. You will see there are still some adjustments needed to get the hand in the proper position on the clock face. You should also notice the clock face is centered at the 0.0 coordinates along the X and Y axes, which was set when we originally placed the clock's body at the beginning of the tutorial.

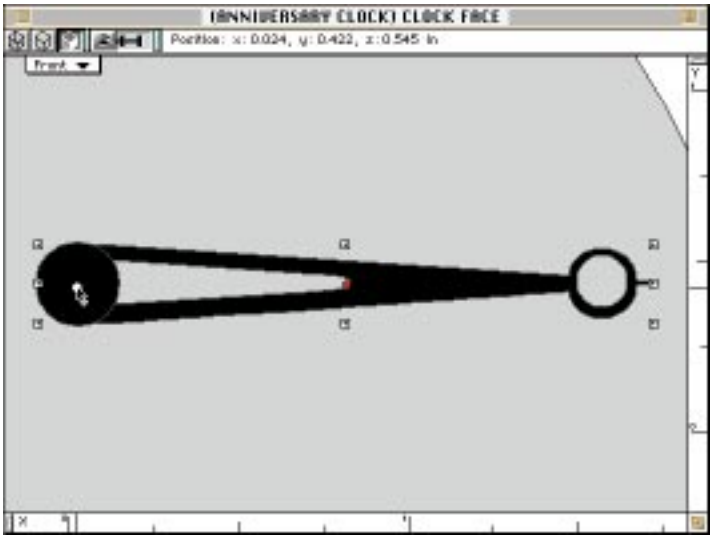
20. Move the minute hand's Origin Point and center the hand.

To correctly place the minute hand and provide an accurate means of rotating the hand into position we must first move the object's center point. This is a simple process that will also allow the clock's hands to be animated later.

It will help to make our view of the minute hand as large as possible while we are moving the Origin Point (the Origin Point is the same as the object's center point). You could use the Magnification tool from the Tools palette to zoom in on the minute hand, but it is simpler in this case to use an automated technique.

With *only* the minute hand selected, choose the *Fit Views to Selection* command from the Windows menu. The screen will redraw with the minute hand at maximum magnification for the window size.

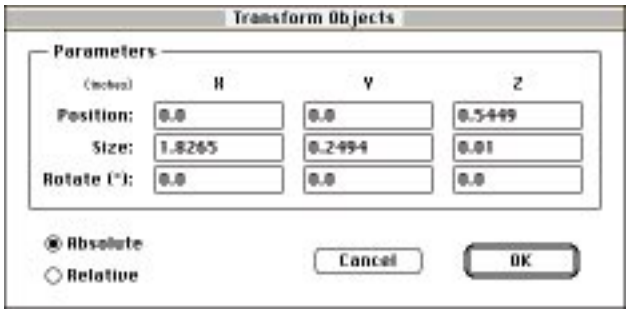
To move the Origin Point, hold the Command key down and click-and-drag the Origin Point to the center of the minute hand's mounting circle (you may want to also depress the Shift key after the point begins to move to constrain the movement horizontally).



Notice how the point changes color when you grab it. If the entire object moves when you release the mouse button, choose Undo from the Edit menu and try the process again making sure you depress the Command key before *you grab the Origin Point.*

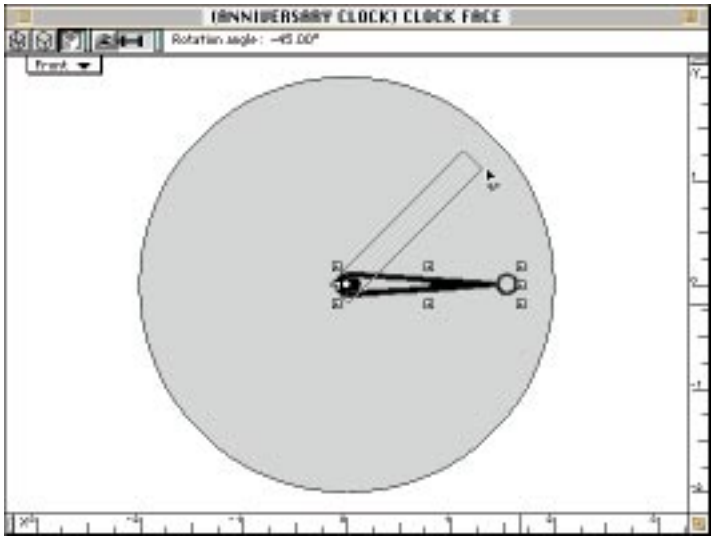
Now use the *Fit Views to All* command (or you can use the Command-Equal (=) keystroke shortcut to adjust the view to fit everything in the window.

With the minute hand selected, use the Transform command to center the object on the clock's face by ensure the X and Y axes are set to 0.0. Leave all other fields unchanged even if they do not match this illustration.



With the object centered, select the Object Rotate tool from the Tools palette and drag one of the minute hand's corner handles to rotate the hand to a position roughly between one and two o'clock.

You can rotate objects precisely by watching the window's Feedback area as you rotate the shape. In this case, you would stop rotating the minute hand at about 45 degrees.



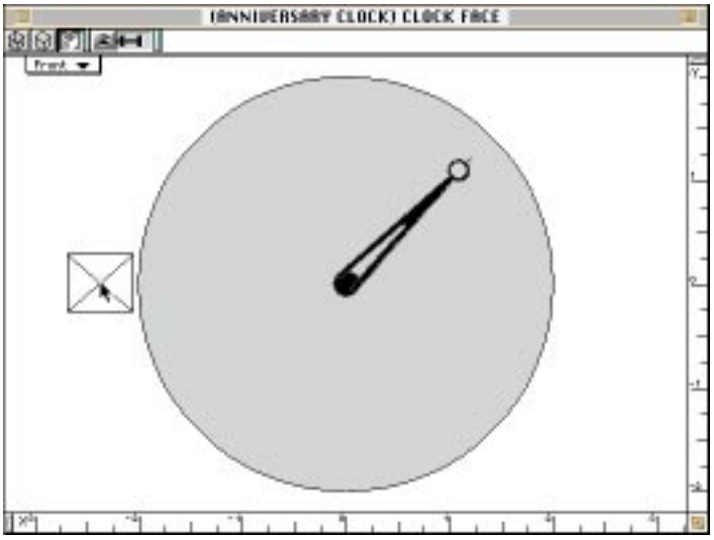
Save ⌘S

That's it. Now we must follow the same basic steps to insert the hour hand.

21. Insert the SMALLHAND shape and position it on the clock face.

Find the SMALLHAND shape in the Shapes palette and select it using the General Move (or pointer) tool.

Rather than using the Insert button to place the shape in the workspace, drag the SMALLHAND icon from the palette to a position near the clock face and release the mouse button (this is the same Drag 'n' drop method you used earlier with textures).



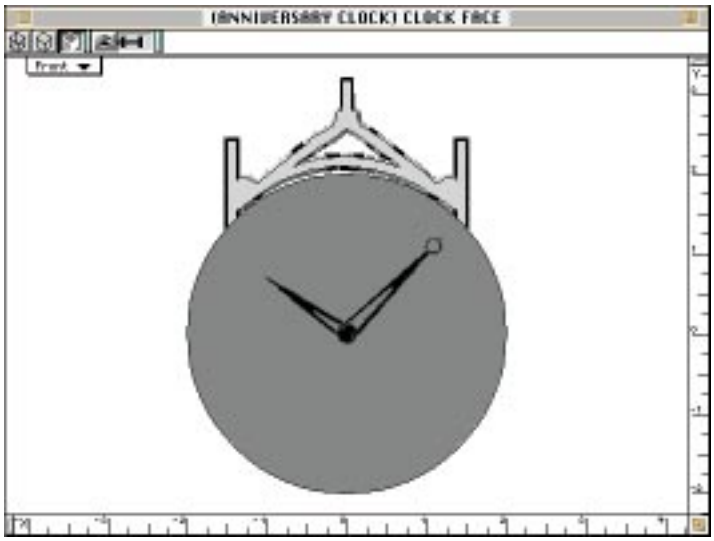
Unlike using the Insert command to place a shape in the modeling window, the Drag 'n' drop method forces the hour hand to be drawn in the position you dropped it.

With the SMALLHAND shape inserted, switch to the Top view and drag the hour hand to a position between the clock's face plate and the minute hand. Then, switch back to the Front view and use the *Fit Views to Selection* to zoom in on the hour hand.

As with the minute hand, drag the Origin Point to the center of the hour hand's mounting circle. Again, use the *Transform* command to move the hour hand into position on the clock face making sure you do not change the Z axis setting.

With the Object Rotate tool, rotate the hour hand to the 10 o'clock position (roughly -145 degrees in the Feedback window).

When the hands are properly positioned, bring the hidden objects back into the workspace model by choosing the *Show All* command from the Selection sub menu in the Edit menu (you can also use the Command-4 keystroke shortcut).



Use the *Fit Views to All* command to bring the entire model into view in the workspace window.

Save ⌘S

22. Apply the Metal-brass texture to the clock's body and decorative crown.

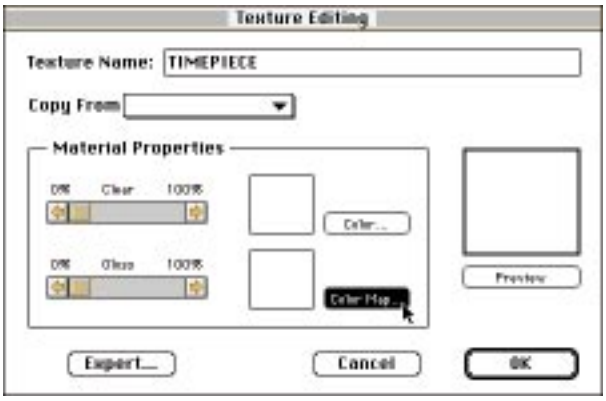
Switch to the Back view (this will make it easy to apply the texture to the correct piece) and using the drag 'n' drop method, apply the Metal-brass texture from the Texture palette to the clock's main body and the decorative crown adorning the clock. Each object's color will change when the texture is applied.

Switch back to the Front view. Notice how the crown's color is brighter from this view. That is because there is no light source hitting the back side of the objects, leaving that view in the shadows. There is also no change to the clock's face. This is because we separated the face of the clock from the main body earlier in the tutorial, making the face a separate shape from the body. The face will get a special texture map all its own, which we will build next.

23. Build the special TIMEPIECE texture for the clock's face.

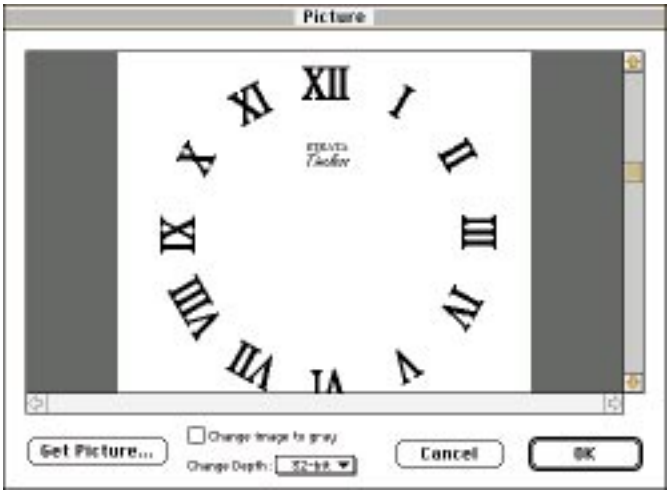
Deselect all objects and switch to the Texture palette. Click on the New button to create the special texture map you will use for the clock's face.

When the Texture Edit dialog appears, give the new texture the name TIMEPIECE and click on the Color Map button.



The Picture dialog will appear in place of the Texture Editing dialog after you click on the Color Map button. This is where you can import a graphic made in a paint or draw program to become part of the new texture map.

From the Picture dialog, click on the Get Picture button and select the PICT file named TIMEPIECE in the tutorial folder.



A clock face will appear in the Picture window and the Change Depth field will indicate you have imported a 32-bit graphic. The settings are correct for this tutorial, so you can click OK when you are ready to proceed.

A warning dialog should appear to inform you the file size is larger than 256 KBytes. This is a safety feature to keep you from building texture maps that could eat up memory unnecessarily. In

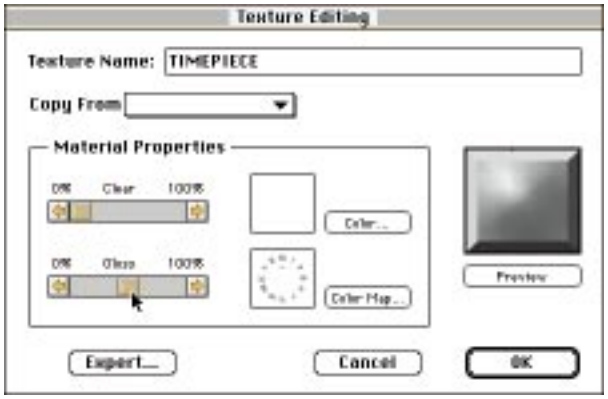
this case, we need the picture to remain at actual size so it will cover the entire face of the clock.

Click on the Keep Large button to import the picture and return to the Texture Editing dialog.

This image exceeds the recommended storage requirements of 256 KBytes. It should be reduced to a smaller size.
Keep Large
Reduce

Notice how a picture of the clock face has been placed in the Color Map preview window.

Move the Gloss slider bar about half way between 0% and 100% to give the clock face a slightly shiny finish.



We do not need to add color to the map because the clock face will be white with black text, so disregard the Color button for this texture map. Click OK when you are ready to move on to the next step.

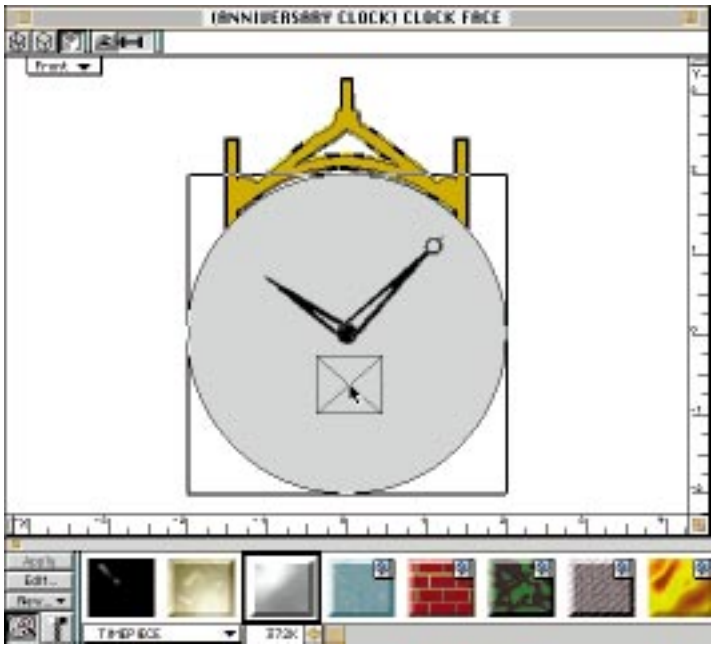
Save ⌘S

The new texture will now appear in the Texture palette with the name TIMEPIECE. The icon preview, however, will only show a small portion of the total map, so you may not be able to see any of the numbers on the clock. This is because we kept the original map at its full size and is correct.

24. Apply the TIMEPIECE texture map to the clock face.

Make sure the CLOCKFACE workspace is in the Front view. Find the TIMEPIECE texture map in the Texture palette and use the drag 'n' drop method to apply the texture to the clock's face plate.

You will know when you are over the face plate when a heavy black outline appears around the entire face of the clock. Be careful not to drop the texture on one of the clock's hands.



Save ⌘S

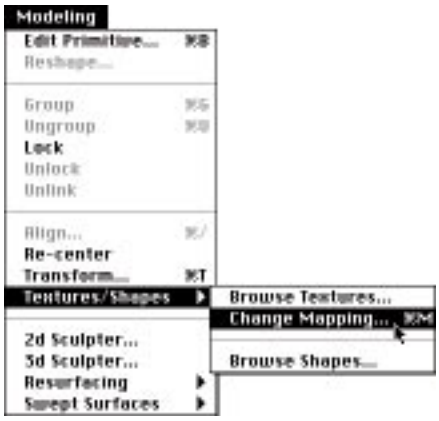
The shading on the clock face will change slightly after the texture map is applied, but you will not be able to see the numbers on the clock until it is rendered. The modeling windows are designed to give the fastest possible redraw speed. Therefore, even in the Quick Shade view mode there will be a lack of detail while working in the modeling environment.

The picture you imported to create the texture map for the clock face should fit properly on the face plate without significant adjustments. However, to ensure a proper fit, especially if your clock was not built to the right dimensions, the texture map may need a slight adjustment.

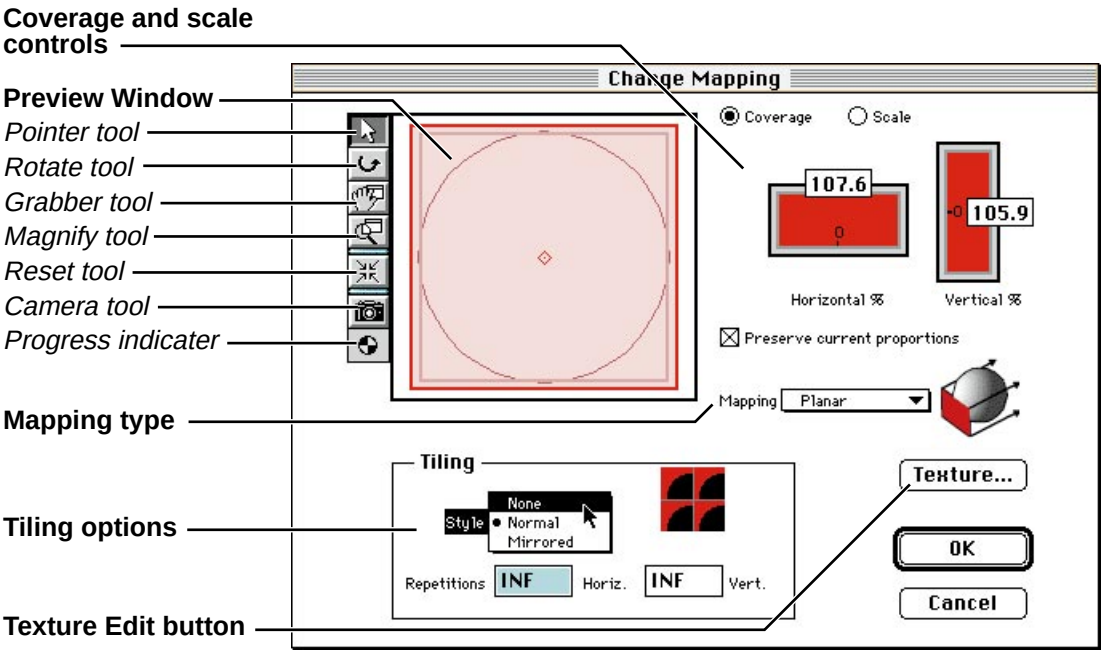
25. Adjust the texture map on the clock's face using the Change Mapping command.

The *Change Mapping* command allows you to customize how a texture is applied to an object. This function can be used with any object that has a texture applied to it. Change Mapping only affects the object you have selected for the operation and does affect other objects in the model even if they have the same texture applied to them.

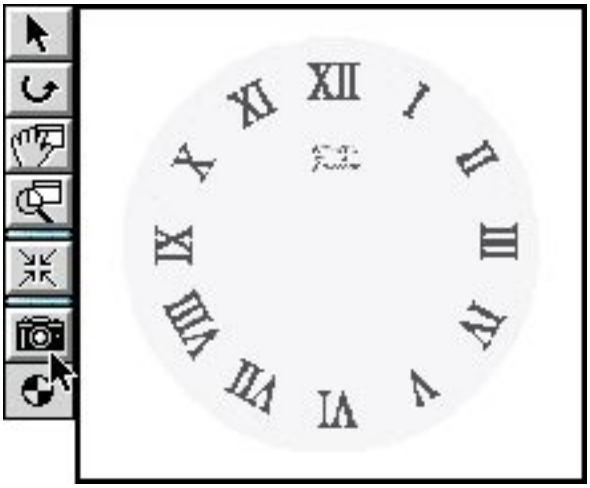
With the clock face selected, choose the Change Mapping command from the Textures/ Shapes sub menu in the Modeling menu. This will call up the Change Mapping dialog.



When the Change Mapping dialog appears, you should change the Tiling Style to None. This will prevent the texture from repeating across the face plate's surface. Also, set the Mapping option to Planar to apply the texture map to the surface like a decal and ensure the *Preserve current proportions* checkbox is checked.



To see how the texture map will look on the clock, click on the Camera tool in the preview window's tool palette. The preview window will redraw to show you how the texture will fit in the final rendering.



While you should not have to make adjustments such as rotating the map or moving the map on the object, the preview window's tool palette provides the means to accomplish such feats. Click OK when you are ready to return to the modeling workspace.

More information of the Change Mapping option can be found in Vision's Reference Manual.

That should finish the clock's main body construction. You could now close the CLOCKFACE window and move on to the next step, but you're probably just a little curious to see what you've created so far. So let's take a quick snapshot to check the work.

26. Take a snapshot of the CLOCKFACE window.

You should first make sure the lighting parameters are set for the rendering by choosing Lighting Effects in the Rendering menu.

Click on the Scaled radio button in the Light Overflow Handling menu for a more realistic look in the final rendering. Click OK to return to the workspace.

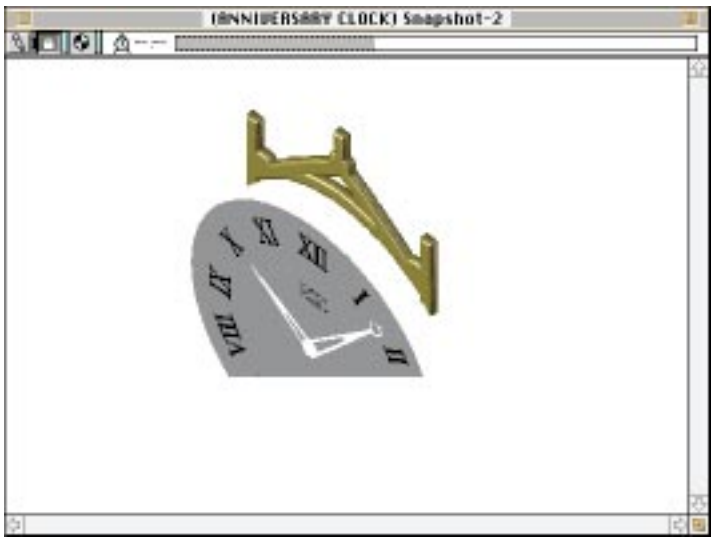
Save ⌘S

Now select the Large Camera tool from the toolbox. Notice how the cursor changes to a 35 mm camera body when it passes over the modeling window.

From the pull-down menu under the Large Camera tool, select Good from the Stills sub menu.

You may want to switch the viewing method to Normal to add perspective and change the view to Isometric to get a more appealing angle on the model. Use the *Fit Views to All* command to make the model fill the window.

Move the cursor to any position in the workspace window and click the mouse button to start your rendering. The rendering window will appear with a feedback area along the top to keep you informed of the rendering process.



If you want to take a second snapshot with a higher quality rendering, try choosing the Best option from the Stills sub menu in the Large Camera tool's pull-down selection menu. The Better and Best settings use the Raytracing method of rendering and produce a more photo-realistic rendering.

Try experimenting with the Rotate View tool to get a different angle on the model for other snapshots. The Rotate View tool does not affect the actual model, just the angle you see it from. You can always return to the Front view if you get lost.

HINT *If some of the fine lines of the model (such as the numbers on the clock's face) seem to disappear in your Raytracing, don't panic. This sometimes happens when the renderer's parameters are not adjusted to pick up finer details in a model. The Raytracer's rendering parameters have been preset by Strata's engineers to produce the best all-around results in most situations. These setting can be changed in the Raytracing Esoterica dialog, which can be accessed through the Raytracer's Expert button. However, you should make sure you fully understand these settings before changing them. For now, it may be better to hold off making such adjustments until we reach the end of this tutorial when we will ensure the finer details appear in the final rendering. More information on the Raytracing Esoterica is offered in the main Reference Manual.*

When you are finished rendering and are ready to move to the next phase of this tutorial, close the CLOCKFACE workspace and read on.

27. Create a New Shape named POST.

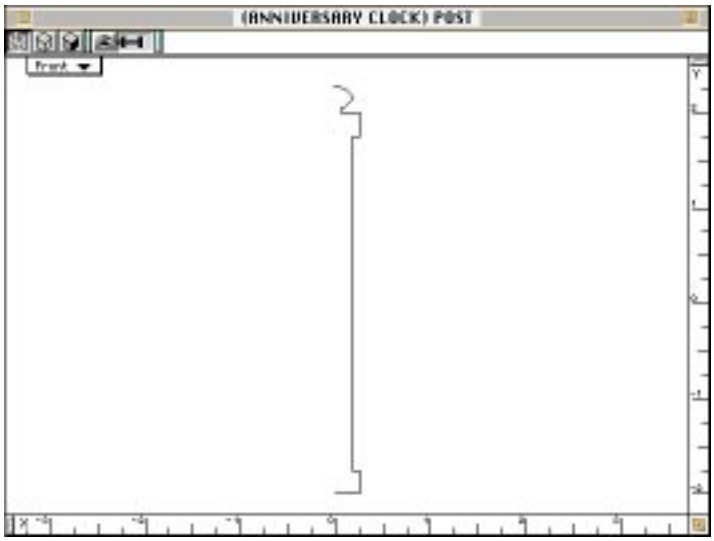
By now, creating a new workspace should be almost second nature. Just click on the New button in the Shapes palette and give the new workspace a name.

Before you start to build anything, use the *Actual size view* command in the Windows menu to make sure the object will be scaled accurately.

28. Draw a partial outline of the clock's support post with the Open Polyline tool and lathe the line to create a 3D object.

Select the Open Polyline tool from the Tools palette and, clicking to set each segment of the line, draw a partial outline that will become the support post for the clock when lathed.

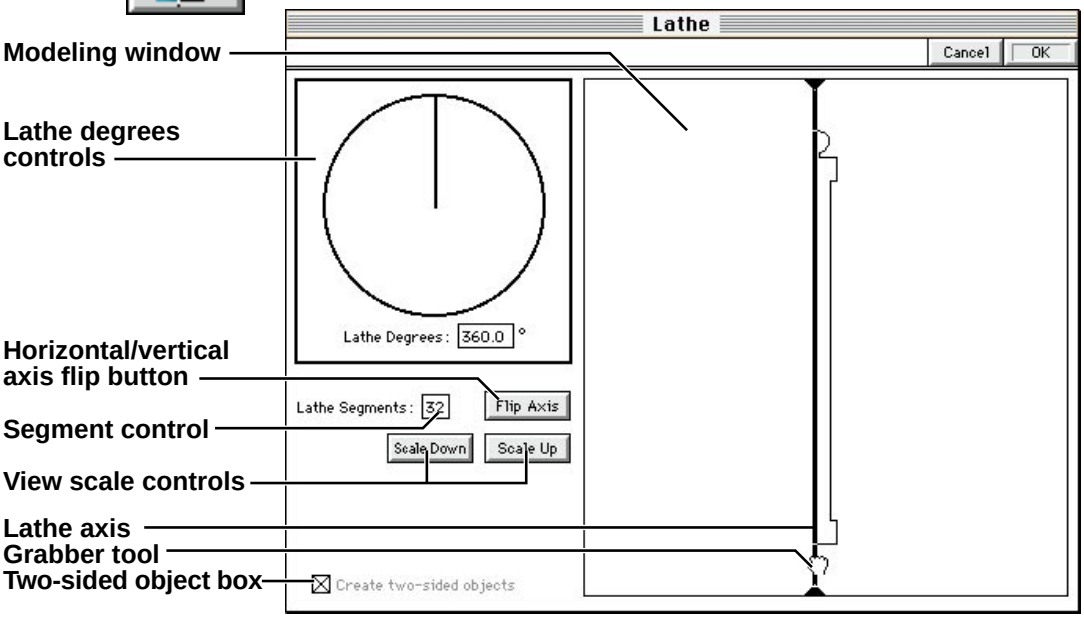
Make the outline 4.25 inches tall and about a quarter inch wide. Once lathed, the object will measure about half an inch wide. If you set a point with the Open Polyline tool in the wrong place, you can remove that point by pressing the Delete key immediately after the point is set.



HINT

You can backtrack over each point by repeatedly pressing the Delete key. However, you can not edit the points in the modeling window once you double click the mouse, which finishes the drawing.

29. With the polyline you just drew selected, choose the Lathe modeler by clicking on the Lathe button in the button bar.



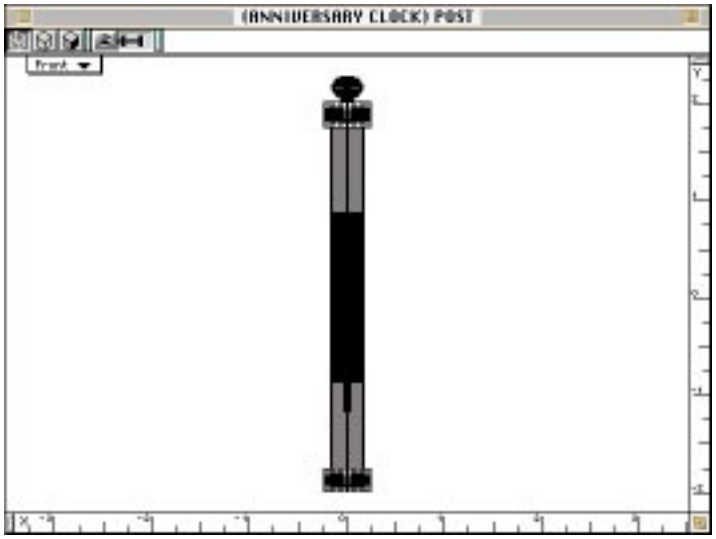
When the Lathe Dialog appears, set the number of Lathe Segments to 32 and ensure the Lathe Degrees field is set to 360.0°. If the Lathe axis bar is positioned horizontally in the extension's modeling window, click on the Flip Axis button to put the bar in a vertical stance.

When the cursor moves over the axis bar it will change to a Grabber Hand, which you can use to drag the axis to where it slightly overlaps the two open ends of the polyline in the modeling window.

When the axis bar is in place and the field settings are correct, click OK to perform the operation. You will be returned to the modeling workspace when the Lathe operation is finished. The window will redraw to display the new, 3D support post you just built.

HINT

You can choose Undo from the Edit menu immediately after the lathe operation to return the object to its original polyline form. You can also re-lathe the object at any time (provided you have not broken the object's link to the modeler) by choosing the Re-lathe command from the Modeling menu. More information about modeler-object links is offered in the Reference Manual.



The grouped object created with the Lathe modeler should look similar to this illustration when the operation is complete.

As long as the overall measurements of the object are close to those indicated in this tutorial when you drew the polyline, slight differences in the size or shape of the top ball or bottom footing piece are acceptable.

Save ⌘S

30. Apply the Metal-brass texture to the POST shape.

Drag 'n' drop the Metal-brass texture from the Textures palette onto the support post in the POST workspace and close the window.

31. Create a New Shape workspace named BRIDGE and build a skinned FlexObject™ support bridge to hold the clock body.

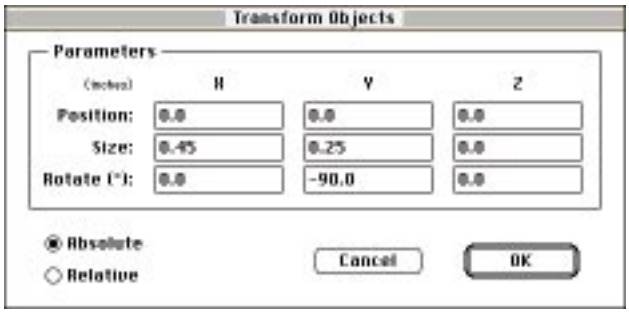
Building a skinned FlexObject™ can be a little tricky because, while you can use virtually any combination of 2D shapes to form the object's ribs, the starting and ending vertex points must be lined up to prevent the object from twisting when the skin is applied. However, this can be easily avoided with a few simple precautions during the rib-building phase.

In the new workspace (remember to choose the *Actual size view* command), switch to the Left view and draw a rectangle slightly less than half-an-inch long by one-quarter-inch tall. You can use the rulers along the outside edges of the workspace window to gauge the rough size. Use the *Transform* command set to Absolute measurements to fine tune the dimensions to 0.45 inches tall (the X axis) and 0.25 long (the Y axis).

HINT

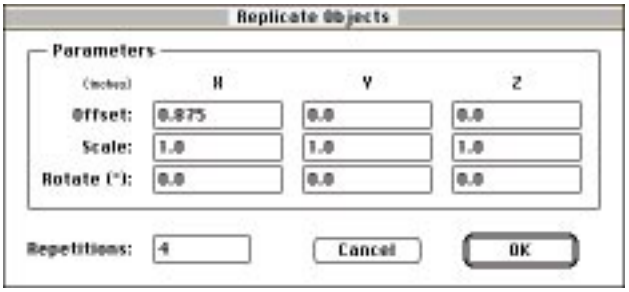
You will notice the rectangle's measurements are along the X and Y axes even though it was drawn from the left side along the Z and Y axes. This is because Vision 3d uses the Front view to coordinate the dimensions, then applies the appropriate rotation to the object to fit the actual view. This is indicated by the -90.0 degree rotation in the Transform command's Y axis Rotate field.

You should also set each of the Position fields to 0.0 to center the rectangle in space. Click OK when you have the settings right.



Next, with the rectangle selected, choose the *Replicate* command from the Edit menu.

You can create exact duplicates of the rectangle and offset them in space through the Replicate dialog.



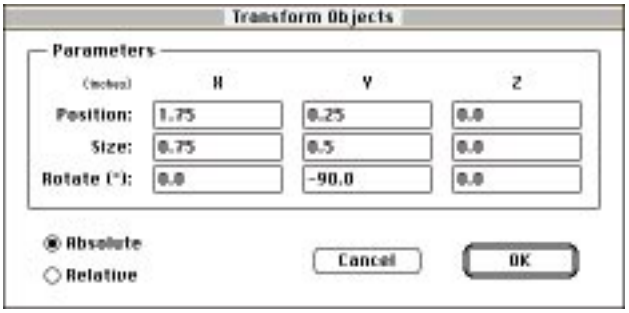
Set the Parameter fields to offset the new rectangles by 0.875 inches along the X axis. The Y and Z axes offsets should be set to 0.0. Leave the Scale fields at the default settings of 1.0 for each axis and set the number of Repetitions to 4. Click OK to continue.

You will not see any difference when you return to the workspace because each of the new rectangles is lined up exactly behind the first. Switch the view to Front and use the *Fit Views to All* command to fit all the rectangles into the modeling window.

Your window should display five identical, equally spaced rectangles. Click anywhere in the workspace to deselect the rectangles, then reselect the center rectangle and open the *Transform* command.

Change the center rectangle's position by changing the Y axis Position field to 0.25. Then change the scale by setting the X axis Size field to 0.75 and the Y axis Size field to 0.50.

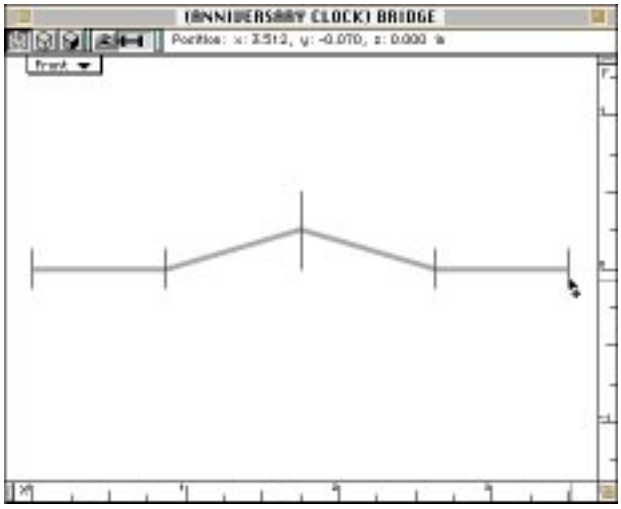
Transforming the rectangle will create a larger area for the clock to be mounted on in the final FlexObject™. Set the fields as indicated and click OK to continue.



Choose the Link tool from the Tools palette and link all five rectangles starting from the left side. To link the objects, click and

drag from the first rectangle on the left to the second with the Link tool until both are selected (indicated by a heavy black outline around each of the two objects). When both rectangles are selected, release the mouse button to create the first link. Then, click again on the second object and drag to the third in the chain. Continue the process until all the objects are linked in a continuous chain.

Switch to the General Move tool and select the final rectangle in the chain to check the link. A thick, gray line should appear between each rectangle when the mouse button is depressed to show all are linked to each other.



Save ⌘S

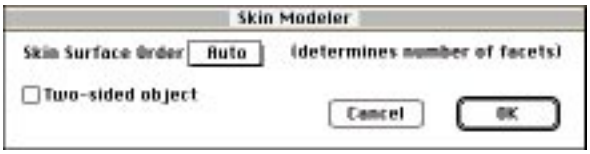
If the gray line does not appear between any two rectangles, retrace the linking steps to ensure each rectangle is properly linked (remember, when linking objects, both objects must appear with a thick black line indicating they have both been selected before the link will be established).

HINT

The first rectangle in the chain will not show a link when selected. If you select any of the midway rectangles you will only see the link to those rectangles before it in the chain. In other words, if you select the middle rectangle, the gray line will only appear between that rectangle and the two rectangles to the left of it.

Use the *Select All* command (Command-A) to select all five rectangles in the workspace. Then, choose the Skin extension from the button bar to open that modeler's dialog.

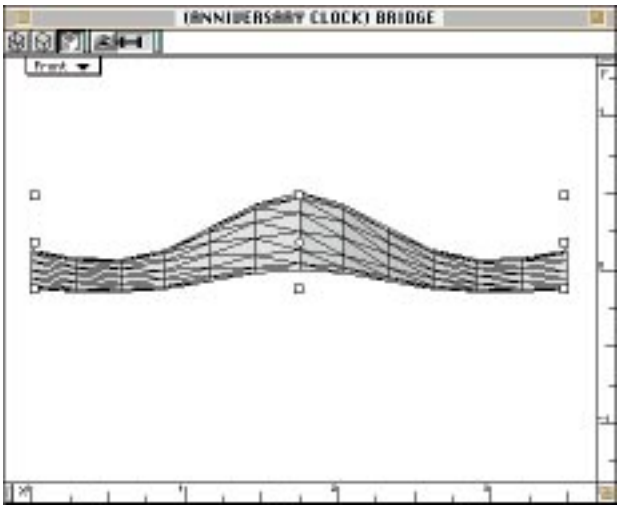
For this tutorial, use the Skin modeler's default settings.



Click OK when you are ready to perform the operation and return to the modeling window.

When the operation is complete, the screen will redraw showing a curved, 3D shape that resembles a mustache. Of course, the shape is actually squared on the edges, which you see more clearly if you change to a shaded Isometric view (be sure to return to the Front view when you are done examining the object).

The FlexObject™ you created with the Skin modeler will serve as the bridge upon which the clock's body will be mounted.



32. Apply the Metal-brass texture to the FlexObject™.

As before, apply the Metal-brass texture to the new object using either the drag 'n' drop method or the select-apply method described earlier. Save the model and close the workspace when you are finished.

Save ⌘S

33. Build the clock's external movement apparatus.

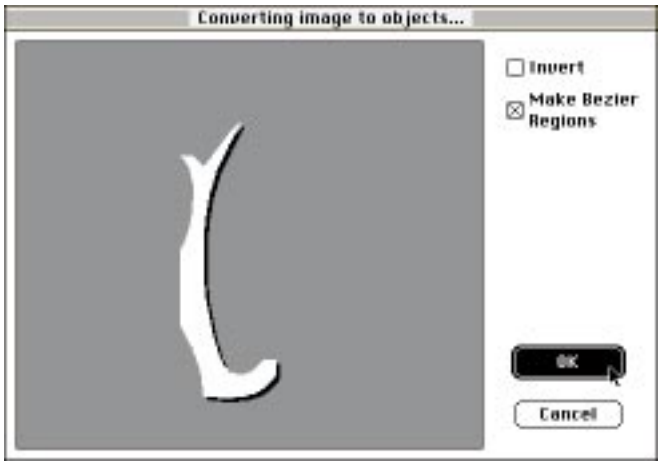
Create a New Shape named MOVEMENTLEG and choose the *Actual Size View* command to set the window dimensions correctly. For this phase of the tutorial, we will import a wireframe-style graphic file from a draw program in the same manner used for the clock's decorative crown piece.

HINT

You can create this type of graphic using almost any draw program provided Vision 3d recognizes the format the graphic is saved as (check the Reference Manual for more information on importing graphics from other programs and format compatibility).

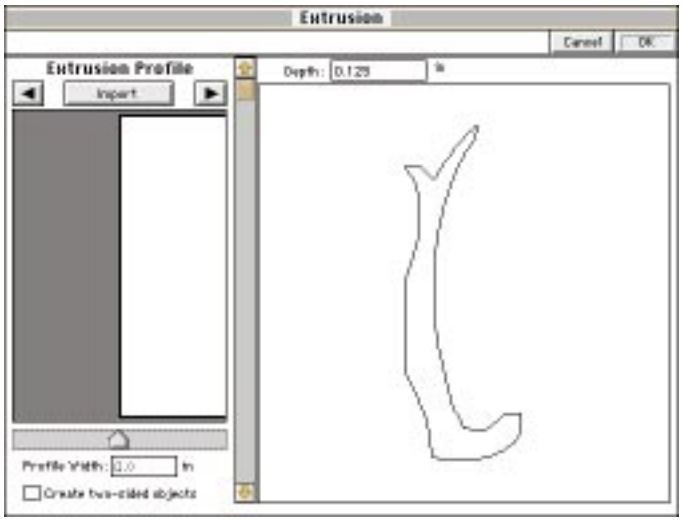
Choose the *Import* command from the File menu and select the graphic file named LEG in Vision's Tutorial folder.

When the Import dialog appears, ensure the Make Bezier Regions checkbox is checked and click OK to import the file and return to the modeling window.



Place the graphic in the workspace. With the graphic selected, choose the *Ungroup* command from either the Modeling menu or the button bar.

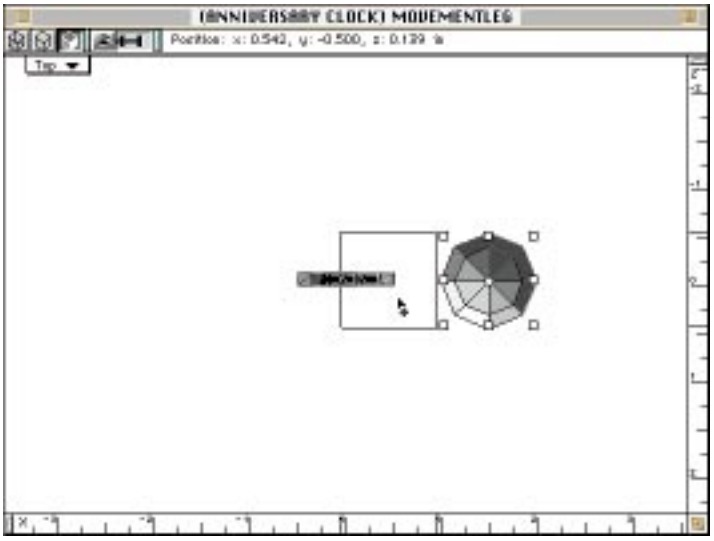
Now that the graphic is ungrouped, we can choose the Extrude modeler from the button bar and extrude the object to a depth of 0.125 inches. Use the square-edged bevel for this operation and click OK when you are ready to proceed.



When the extrude operation is complete, switch to the Top view and choose the Sphere tool from the Tools palette. With the Sphere tool selected, single click anywhere in the workspace window to place a one-inch sphere in the model.

HINT

You can always use the click-and-drag method to create any size primitive you want. However, if you simply click in the window with a primitive tool selected while the window scale is set to actual size, Vision 3d will automatically insert that primitive at a one-inch size.

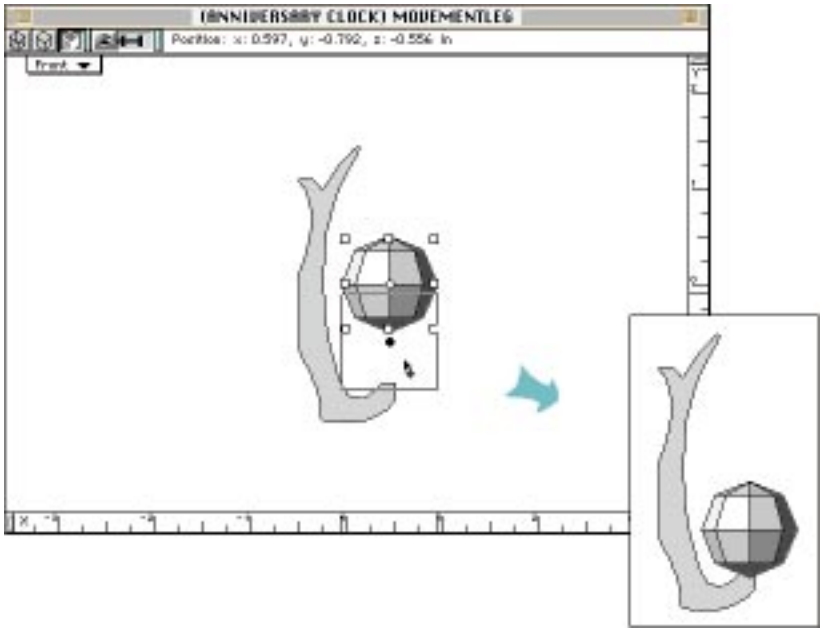


Position the sphere directly over the outside balance arm of the movement leg. You may want to change to the Shaded viewing method to see the objects better.

When you are satisfied the sphere is directly over the balance arm, switch the workspace window to the Front view.

In the Front view, drag the sphere until it overlaps the balance arm slightly.

Use the Shift key once the sphere is in motion to constrain the movement vertically.



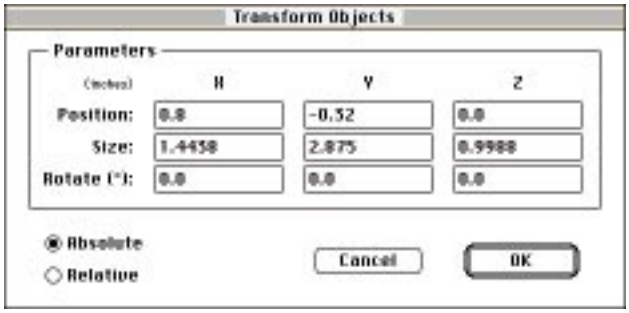
Save ⌘S

Apply the Metal-brass texture to each object and close the workspace.

Create a New Shape named MOVEMENT and, again, use the *Actual Size View* command to set the window dimensions. Size and precise measurements will be important during this phase of the operation, so watch the rulers as you draw and try to match the measurements in the following illustrations.

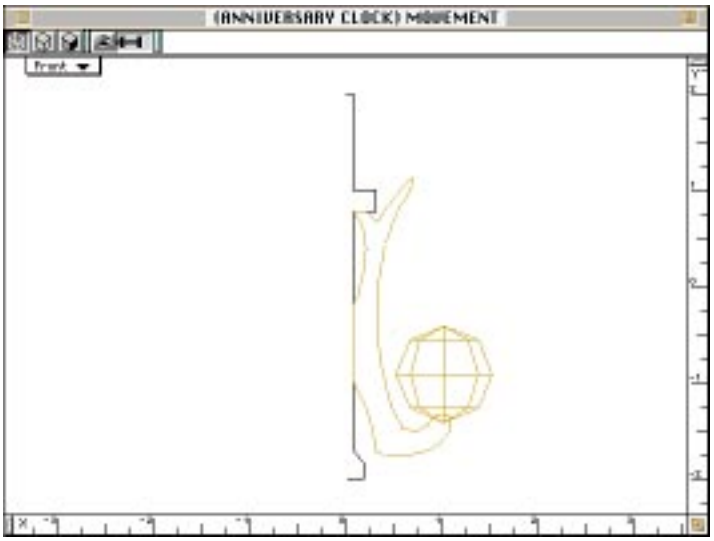
Insert the MOVEMENTLEG shape into the new workspace (you can use either the drag 'n' drop method or the Insert button on the Shapes palette).

Use the Transform command to position the inserted shape at the coordinates indicated in this illustration.



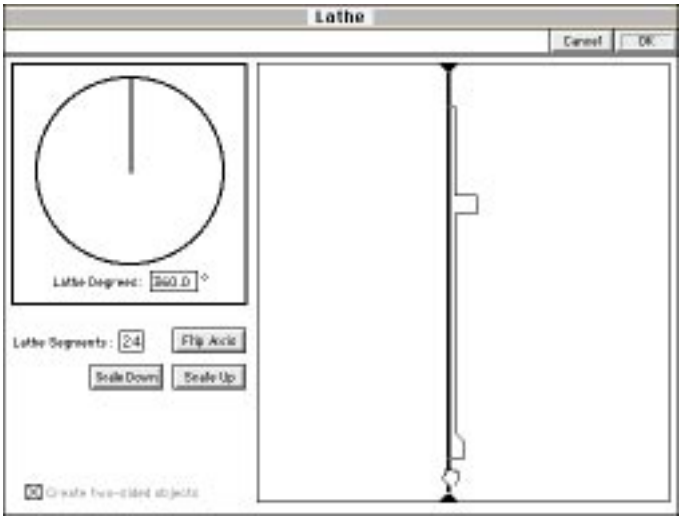
The next step is to draw the movement's pivot rod. The inserted shape will serve as a guide while you build the pivot rod.

With the Open Polyline tool, draw a shape like the one in this illustration, making sure the line overlaps the movement leg. Start drawing the polyline at 0 on the X axis and -2 (negative) on the Y axis. End the line at 0 on the X axis and 2 (positive) on the Y axis.



With the finished polyline selected, click on the Lathe button to open that extension.

Save ⌘S



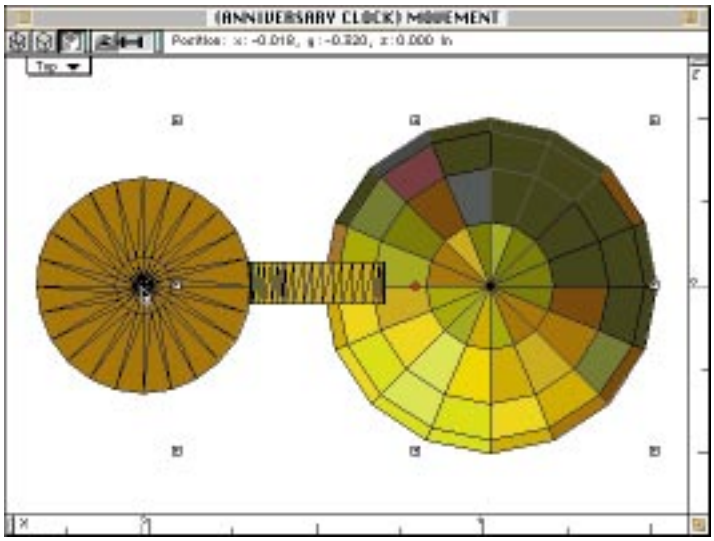
Set the Lathe segments field to 24 and adjust the lathe axis bar to slightly overlap the ends of the polyline. When you are ready, click OK to perform the operation and return to the workspace window.

Save ⌘S

Apply the Metal-brass texture to the newly-created pivot rod and save the model. All we must do now is add three more legs to the movement, which can easily be done with the *Replicate* command.

However, because we will replicate the existing leg and rotate it at the same time, we must first move the MOVEMENTLEG shape's center point.

Switch to the Top view and select the MOVEMENTLEG instance (that's the shape we inserted into the workspace earlier).

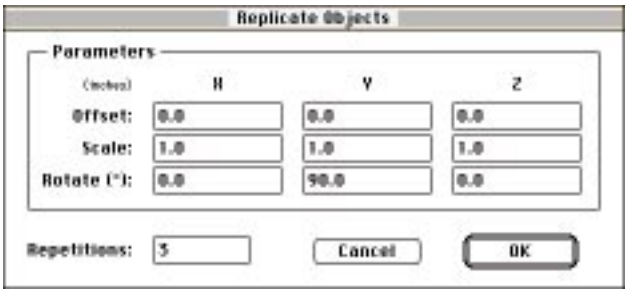


With the MOVEMENTLEG instance selected, hold the Command key down and drag the leg's center point directly over the center of the pivot rod as indicated in this illustration (use the Shift key to constrain the center point's movement horizontally).

Save ⌘S

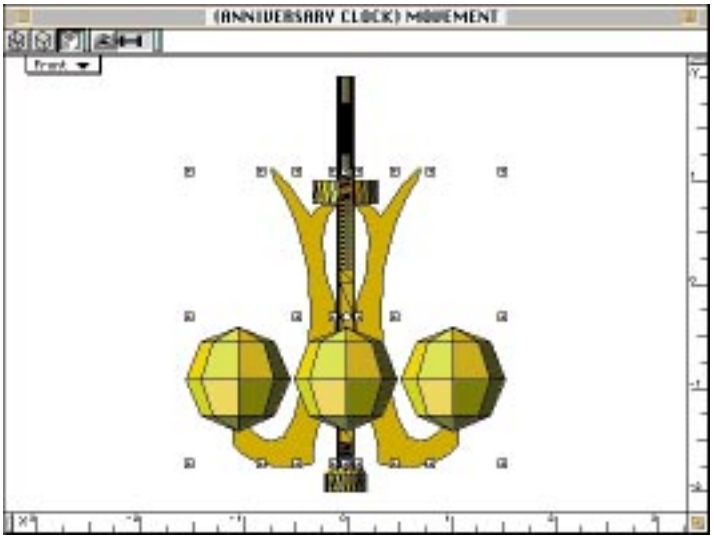
Return to the Front view when the center point is in position. With the leg still selected, choose the *Replicate* command from the Edit menu.

It is important to set the Replicate dialog's fields to match those in this illustration.



Change all the Offset fields to 0.0 and ensure the Scale fields are set to 1.0. Set the Y axis Rotate field to 90 degrees and ensure the X and Z axes Rotate fields are set to 0.0. Finally, set the number of repetitions to 3and click OK to replicate the legs around the pivot rod. When the screen redraws, you should see four legs equally spaced and rotated into position around the pivot rod.

If your model does not look like this illustration, choose Undo immediately and go through the replication steps again.



Save ⌘S

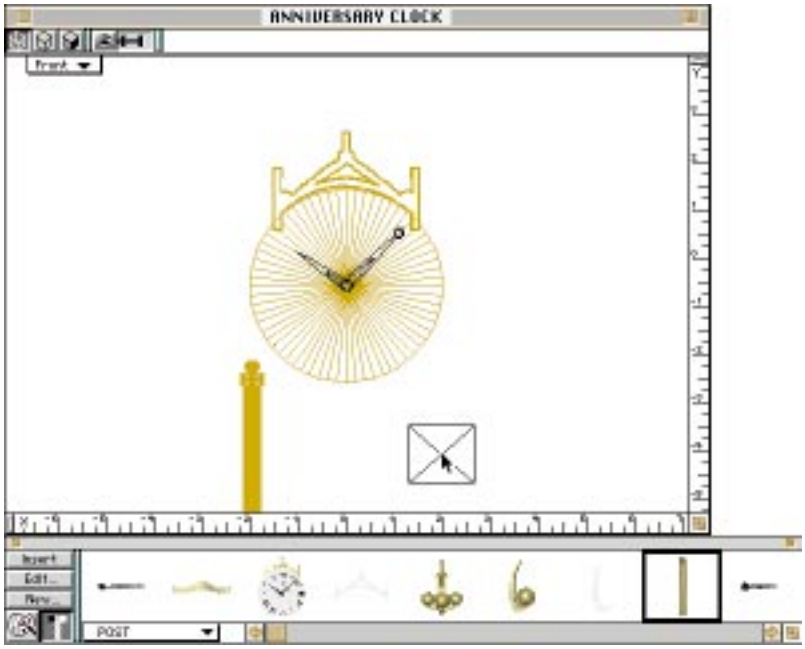
We're almost finished building the various pieces of our Anniversary Clock model. Only the outer case remains to be built. But it will be much easier to build the case around the assembled clock, so let's start putting the pieces together.

Close the MOVEMENT workspace and let's move on.

34. Assemble the clock in the main modeling window.

While in the Front view of the main modeling window, select the CLOCK FACE shape from the Shapes palette and click the Insert button to place the shape. Use the Magnification tool from the Tools palette to zoom out from the shape by holding the Option key down while clicking once on the CLOCK FACE shape. This will give you room to insert the remaining pieces of the clock.

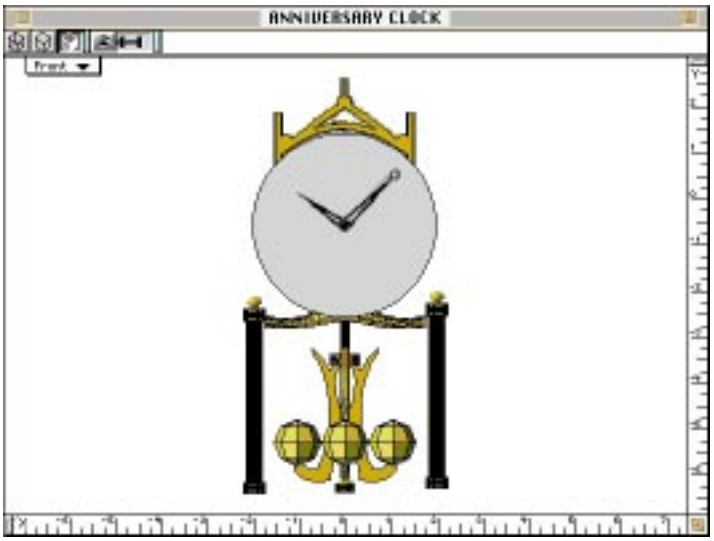
Now locate the POST shape in the Shapes palette and use the drag 'n' drop method to place two instances of the shape in the model. Place the posts on either side and below the clock body.



Don’t worry about exact positioning of the shapes for now, or that portions may extend past the modeling window’s frame. Just drop them in the general areas shown in the previous and following illustrations. We will move them into their exact positions later.

Use the same drag 'n' drop technique to place the BRIDGE shape between the two posts and slightly under the clock’s body. Now drag the MOVEMENT shape into the model and drop it between the posts and under the bridge.

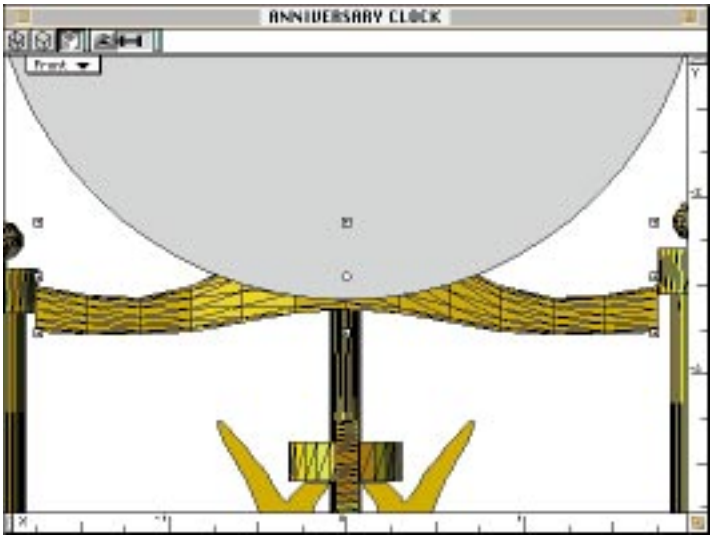
Use the Fit Views to All command to zoom the window in or out so all the pieces of the model are visible. Your window should look similar to this illustration.



Because the clock's body is the focal piece of the model, we will use it as a fixed reference around which the other pieces will be positioned. Let's start by moving the bridge into place.

Select the BRIDGE shape in the workspace and use the *Fit Views to Selection* command from the Windows menu.

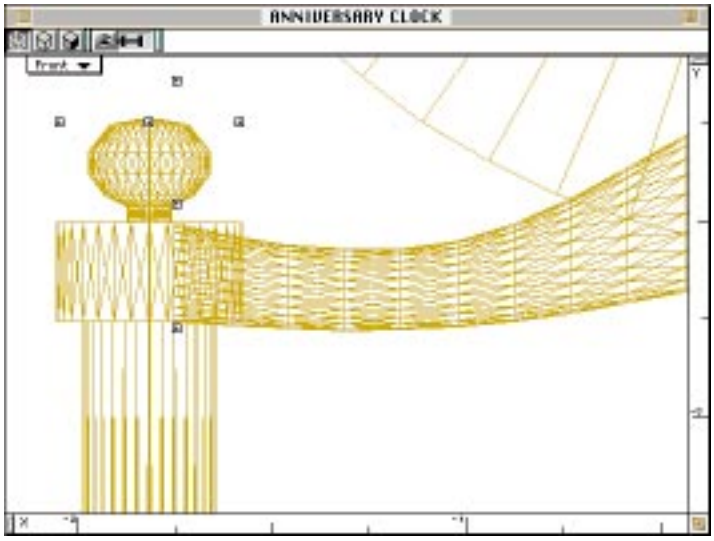
The Fit Views to Selection command will zoom the window in on the selected object. Position the bridge so it is centered under the clock with part of the bridge extending inside the clock body as shown in this illustration.



Now select the post on the left side of the clock and use the *Fit Views to Selection* command to zoom in on that object.

Move the post so it overlaps the end of the bridge and so the post's upper band lines up the bridge. Do the same thing with the post on the right side.

You may want to use the Magnification tool to zoom in on the top portion of the post to make sure the positioning is correct.



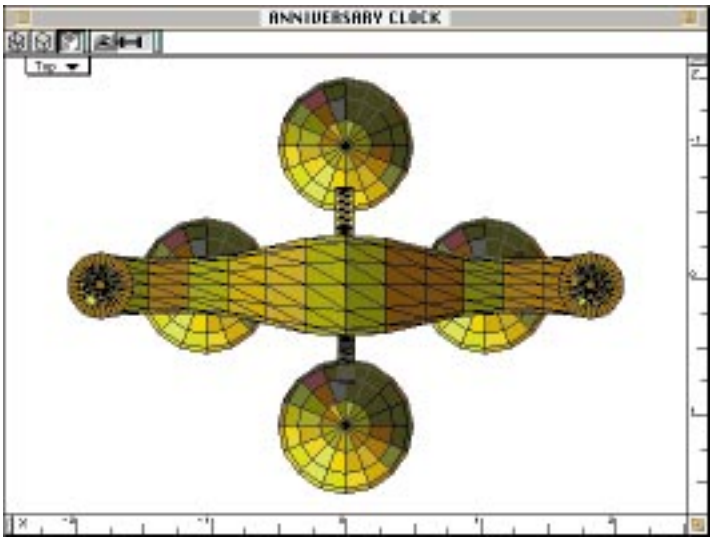
Save ⌘S

Select the CLOCK FACE shape and use the *Hide Selected* command from the Selection sub menu in the Edit menu. This will temporarily hide the clock while you fine tune placement of the remaining pieces.

Switch to the Top view and use the *Fit Views to All* command to zoom in on the model.

Make sure the ends of the bridge are imbedded in the posts so they do not show. Also make sure the MOVEMENT shape is centered on the bridge (select the MOVEMENT object to see its center point, which should allow you to see if it is centered on the bridge).

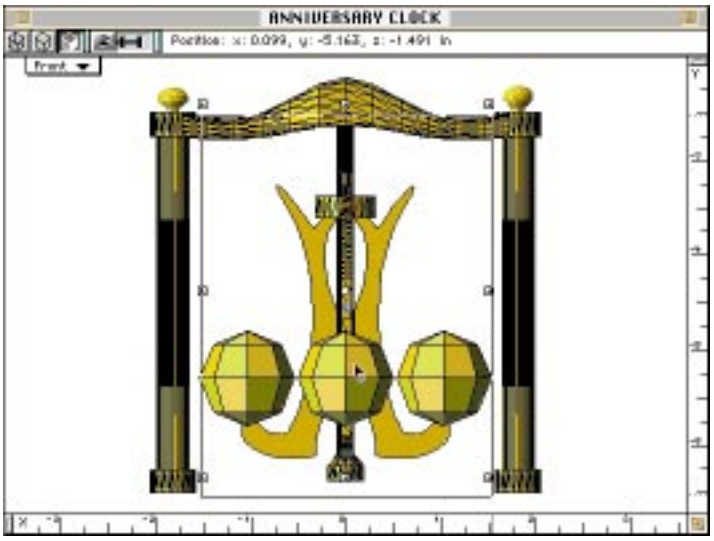
Your model should look similar to this illustration. Make sure each object in the window is lined up correctly before going on to the next step.



When you have everything in place, switch back to the Front view and adjust the position of the clock's external movement.

Drag the MOVEMENT shape up or down so the bottom of the object's pivot rod lines up with the bottom of the two support posts on either side of the clock.

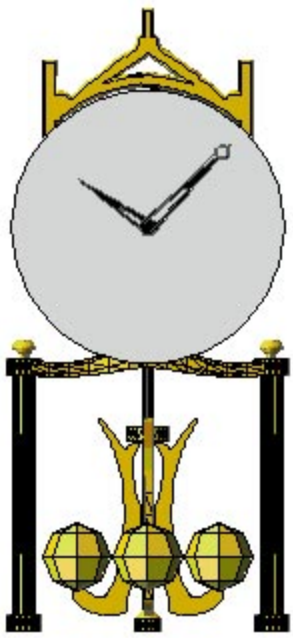
Use the Shift key while moving the MOVEMENT shape to constrain the movement vertically so adjustments you made in the Top view are not altered.



Save ⌘S

The visible pieces of the model should now be positioned correctly. Choose the *Show All* command from the Selection sub menu of the Edit menu to bring the clock's main body back into the workspace and use the *Fit Views to All* command to view the entire project.

Your model should look similar to the left illustration. To ensure the clock body is positioned properly over the rest of the model, switch to the Left view and adjust the clock forward or backward on the Z axis as needed. The right illustration shows how the model should look from the Left view.



Front View

Left View

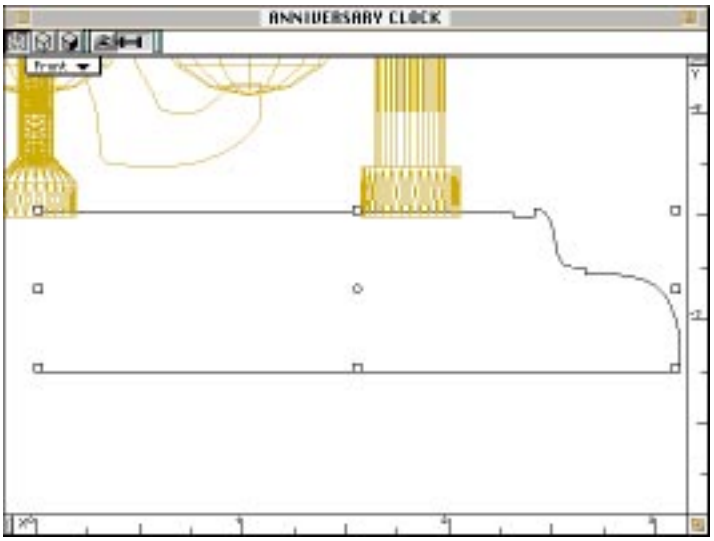
35. Build the clock's base and glass cover.

These are the last remaining pieces to be built in our Anniversary Clock model. They should also be the easiest and the technique we will use will provide you with another new skill and show off the power of Vision's Lathe modeler.

We will now lathe both the base and the glass cover at the same time around the existing model, which will ensure the fit is perfect.

In the Front view, select the Open Polyline tool from the Tools palette and draw the clock's base.

Start from the vertical center of the model (the pieces should be centered vertically on the X axis' zero coordinate) and draw a base for the clock similar to one in this illustration. You may want to zoom in on the bottom of the movement pivot rod and right side support post.

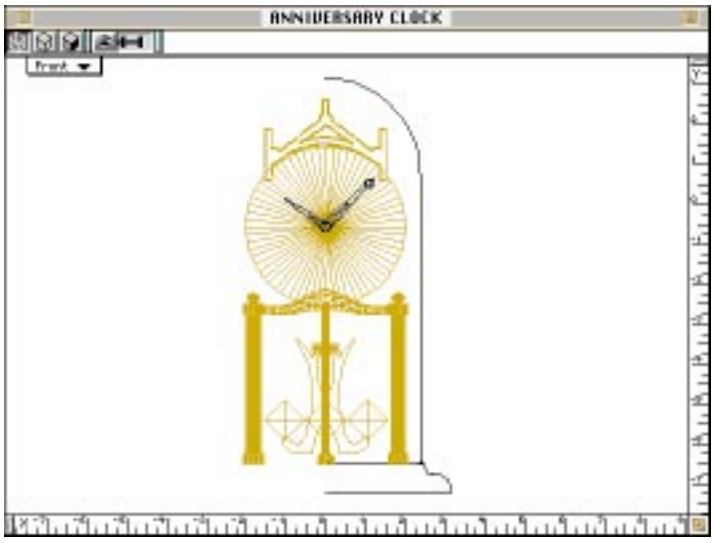


The upper plate of the base should slightly overlap both the pivot rod and support post to ensure there are no gaps in the final model. The base should stand roughly 0.75 inches tall and extend beyond the support post about one inch. Make a small grove in the top surface of the base about one quarter inch past the support post for the glass cover to fit inside.

HINT *You can draw the curved portions of an object with the Open Polyline tool by carefully placing numerous anchor points along the curve. As was mentioned earlier, anchor points are set every time you click the mouse button with the Polyline tool. A line is automatically drawn between each point. Double clicking with the mouse places the last anchor point of the polyline. If you are using one of the Closed Polyline tools, double clicking the mouse button places the last anchor point and automatically draws a line from the last point to the first to close the object.*

Return to a full view of the model using the *Fit Views to All* command and draw a second open polyline from the base and around the model to the vertical center of the clock (again, the zero coordinate on the X axis). Use the groove in the base as a starting point and draw upward along the side of the clock.

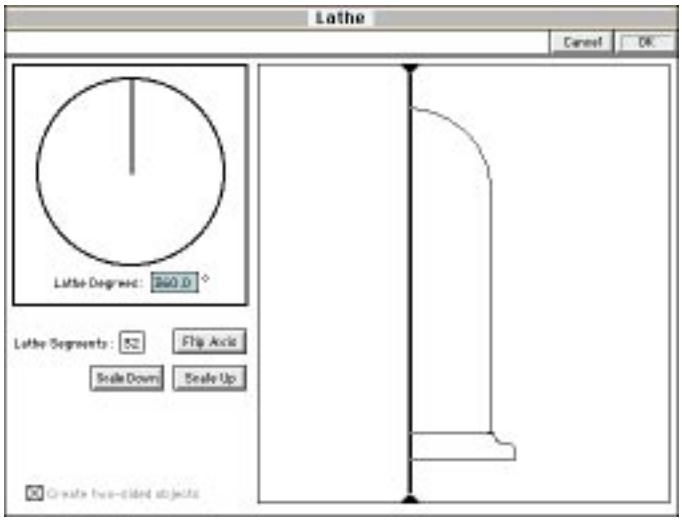
Start curving the polyline at about the same horizontal coordinate as where the crown attaches to the top of the clock. Double click to place the ending anchor point at the zero coordinate on the X axis.



Save ⌘S

Select both the base and cover polylines you just drew by clicking on each while holding down the Shift button. With the two polylines selected, click on the Lathe button to open the extension.

Make sure the Lathe axis is positioned correctly as indicated in this illustration and set the Lathe Segments field to 32 to ensure an extra smooth surface. Also, the Lathe Degrees field should be set to 360.0 degrees. Click OK to perform the operation.



Save ⌘S

When the screen redraws, the clock should be completely enclosed in the lathed case, which is currently a single, grouped object.

36. Ungroup the case and apply textures to each piece.

You will need to ungroup the case to apply a different texture to the base and cover pieces. With the case selected, click on the Ungroup button in the Button bar. A dialog will appear to warn you the link to the Lathe modeler will be broken if you proceed. Click *ungroup* to continue and separate the base from the cover.

Drag 'n' drop the Metal-brass texture onto the base object. Then locate the Glass texture from the Textures palette and apply it to the cover.

37. Edit the Glass texture to achieve a more realistic rendering.

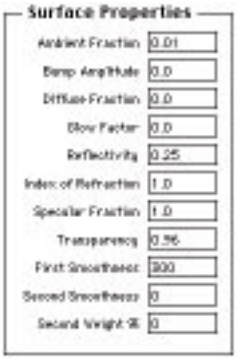
The Glass texture included with the Vision 3d package should produce the desired look in most applications. However, because we are trying to accomplish the look of a thin glass cover we should adjust some of the texture's parameters.

HINT

You can edit any texture at any time. The changes will be reflected globally in your model, affecting every object with that texture applied to it. You do not have to reapply the texture to make the changes take affect. Changes made to a given texture are only in affect in the model that is active when the change is made.

Select the Glass texture from the Textures palette and click on the palette's Edit button. When the editor dialog appears, click on the Expert button.

Change the fields in the Surface Properties section of the Expert Texture Editing dialog to match this illustration and click on the dialog's Done button when you have finished.



Click OK in the main Texture Editing dialog to put the changes to the Glass texture into affect and return to the main modeling window.

Congratulations, you have just completed building your very own Anniversary Clock. All that remains is to render the model and

call all your friends over to amaze them with your graphic artistry. But before you start dialing the phone, lets set the rendering wheels in motion.

38. Render the image.

Before you start the rendering you should make sure all the rendering parameters are set correctly to produce the highest quality image in the most efficient manner. Failure to make these simple adjustments could result in longer rendering time and unexpected results in the final image.

First, select Lighting Effects from the Rendering menu and set the Light Overflow Handling setting to Scaled (this will already be set correctly if you changed the setting when you took the first snapshot of the clock face earlier in this tutorial). Click OK to exit the dialog.

Second, select Rendering Effects from the Rendering menu and turn off the Glowing Surfaces and Bump Mapping options. These do not apply to this model.

Uncheck the check boxes to turn off the rendering effects options. Click OK to set the changes and return to the modeling window.

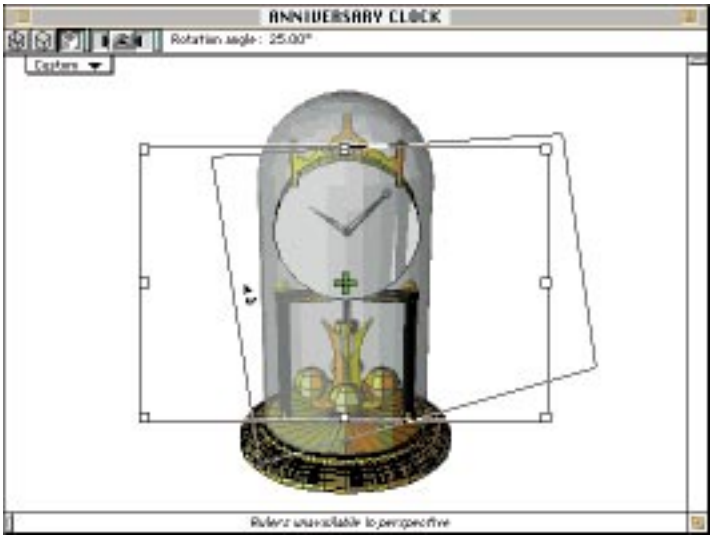
Finally, select Environment Effects from the Rendering menu and choose the Black Background from the Background select pull-down menu and Room Reflected from the Reflected select pull-down menu.

As the names imply, the Background selection box sets the background in the rendering and the Reflected selections box sets the images that will be reflected off objects in the model.

The Environment Effects preview windows may not present a true representation of the selected environment, but it will render fine. Click OK to set your preferences.

In the main modeling window, change the perspective slider to Normal and select the View Rotate tool from the Tools palette.

Drag the View Rotate box 25 degrees to the right by grabbing the center, left handle and dragging it to the right. Then, grab the center, bottom handle and drag the box toward the top of the screen 20 degrees.

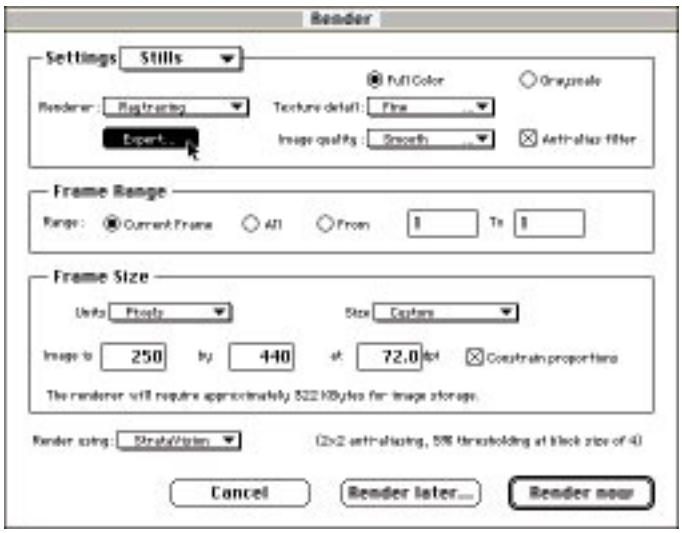


Choose the *Fit Views to All* command to size the window around the model and select the Camera tool from the Tools palette.

Hold down the Shift key while dragging a marquee around the model. The marquee will keep the rendering confined to the clock and the immediate background. Holding the Shift key will open the Render dialog to allow further setting changes.

When the Render dialog appears, change the settings to match those in the following illustration.

Don't worry if the Image field settings in the Frame Size selection box do not match those in the illustration. These fields are determined by the size of the marquee you drew around the model and may vary slightly from those in the illustration.



While still in the Render dialog, click on the Expert button under the Renderer selection box to open the Raytracer Esoterica dialog. This is where we will set the rendering parameters to pick up the fine details in the clock's face.

Set the Esoterica fields to match those in this illustration and click OK to return to the Render dialog.

When you are ready to start the rendering, click *Render now* in the Render dialog. A rendering window will appear over the modeling window. The progress bar across the top of the window will show you the renderer is working. When the renderer is finished you will hear a click like the sound of a camera shutter and information regarding the rendered image will appear in the top feedback space of the window.

If all went as expected, your rendered image should look similar to this illustration. You can now save the finished image and call your friends and family to show off your work.

As you become more experienced in your modeling skills you may want to edit portions of this model or add to it. This is highly recommended as it will expand your knowledge of Vision 3d and add a new spark to your creative enthusiasm.

PHASE THREE: ANIMATION

As a final touch, you may want to add some pizzazz to your model by animating parts of the clock. This is an easy job for Vision 3d.

To demonstrate how easy it is to script an animation, **open the animation palette** by clicking on the filmstrip icon button in the small Button bar in the top, right corner of your screen and follow along with this brief tutorial.

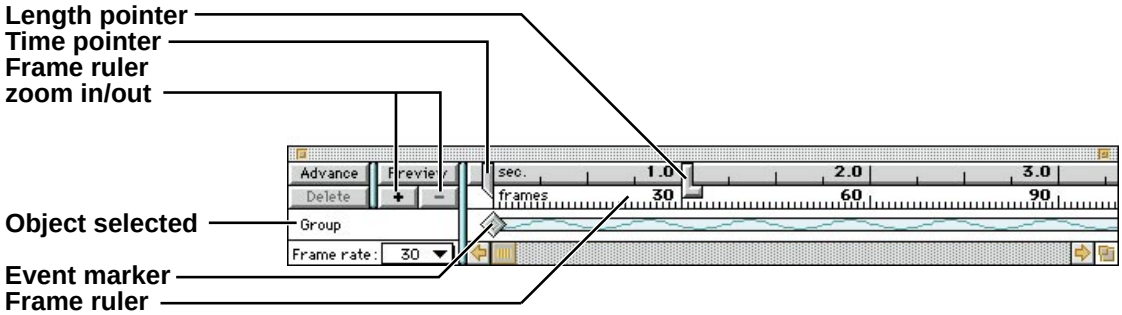
Adding motion to your model

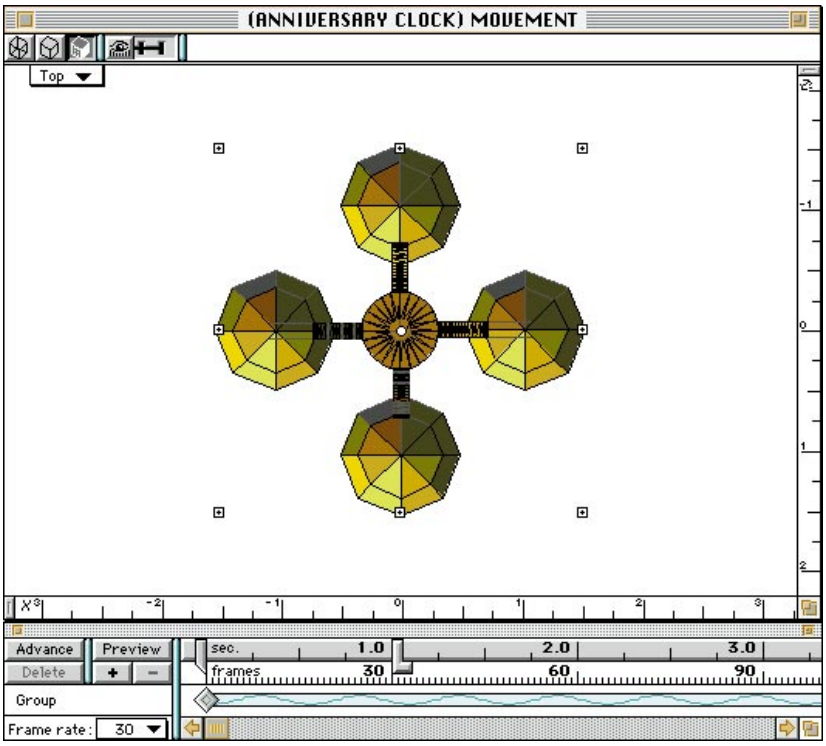
1. Open the MOVEMENT shape and group the pieces together.

Open the MOVEMENT shape workspace by selecting the shape in the Shapes palette and clicking Edit. When the workspace opens, select all the objects in the model using the *Select All* command in the Selections sub menu of the Edit menu and group the objects using the Group button on the Button bar. Use the *Re-center* command in the Modeling menu to ensure the center point is correctly placed after the Group operation and switch to the Top view in the workspace.

2. Establish the animation length and frame rate.

Click on the Advance button in the Animation palette to set the L-shaped Length pointer to one second. This will set the total length of the animation to, you guessed it, one second. Then, drag the straight Time pointer back to the zero second tic mark on the palette and choose 30 frames per second from the Frame rate pull-down menu.





Save ⌘S

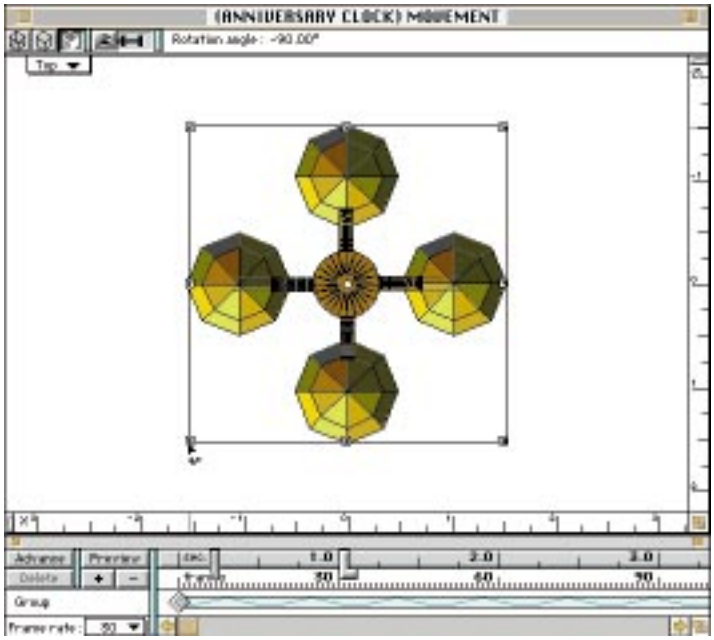
Your workspace should be displaying a Top view of the grouped MOVEMENT model and the Animation palette settings should be the same as the following illustration before you move on to the next step.

3. Add an animation script to the grouped object.

Drag the Time pointer to the 0.25 second mark to establish how long the object's first movement sequence will take to complete. For this animation sequence we will script an event every quarter second.

Choose the Object Rotate tool from the Tools palette and rotate the grouped MOVEMENT object -90 degrees by dragging the left, top handle clockwise until the feedback display at the top of the workspace window reads -90.00 degrees.

When you release the handle the screen will redraw the model window and a new event marker will be placed in the Animation palette at the 0.25 second mark.



HINT

The event marker records the specific position of an object at a specific time. Movement for each frame between event markers is then calculated automatically by the application.

Now, move the Time pointer to the half second mark and rotate the model another -90 degrees using the same technique as before. Another event marker will be placed at the 0.50 second mark.

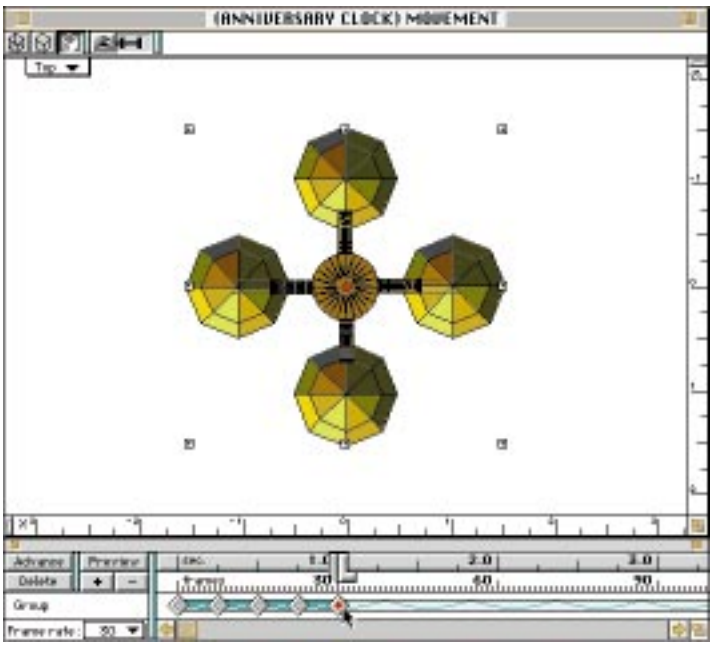
Drag the Time pointer another quarter second to the 0.75 second mark. This time, rotate the model counterclockwise 90 degrees to begin scripting a pendulum-like motion for the object. Watch the feedback display to ensure you are moving the object toward a positive number of degrees.

When the screen redraws and the third event marker is in place, slide the Time pointer all the way to the 1.0 second mark. The Time pointer should now be up against the Length pointer and will not move beyond the one second mark.

The palette is now set up for the last scripting sequence. You could now use the same rotating method to pivot the object back to its starting position. However, to ensure the start and end positions are exactly the same, we will copy the first event marker and drag it to the 1.0 second mark in a single operation.

With the Time pointer positioned at the 1.0 second tic mark, hold down the Option key and click-and-drag a copy of the first event marker to the 1.0 second marker.

A copy of the first event marker will be placed at the one second marker, which will ensure the object ends the animation sequence in the same position as it started.



Save ⌘S

Congratulations, you have just added animation to your model. The movements you have scripted to the object in the shape workspace will automatically be carried over to the complete model in the main modeling window.

To check your work while in the shape workspace, click on the Preview button in the Animation palette. Vision 3d will display a bounding box version of the scripted animation so you can make sure the movement is correct.

HINT

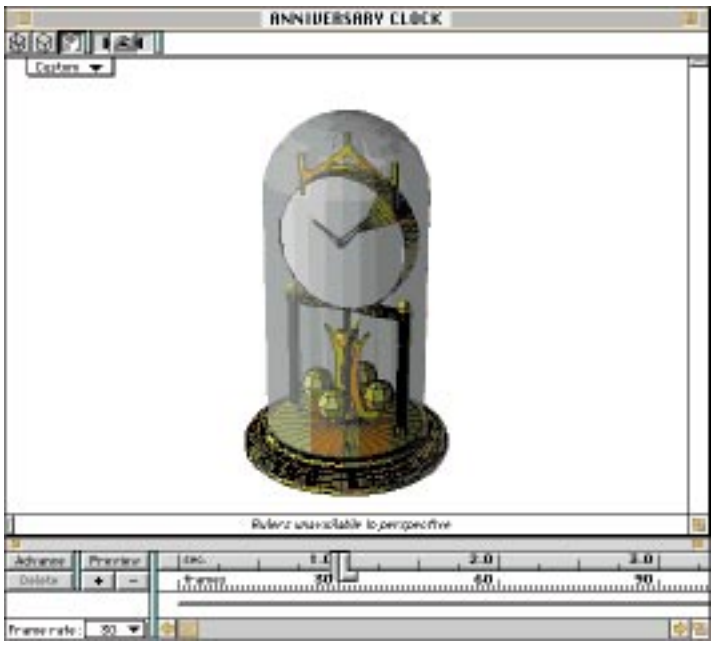
If you make a mistake while scripting the animation, simply drag the Time pointer to the event marker which recorded the error. When the object is redrawn you can move it to the correct position. You could also select the event marker and use the Delete key to remove the marker from the animation line and re-script the object's position at that point on the time line.

4. Close the MOVEMENT workspace.

With the animation scripted, you can close the workspace and return to the main modeling window.

The Animation palette should still be open, but you will notice there are no objects listed on the time line. However, the Length and Time points should still be positioned at the one second marker.

You can click on the Preview button to see the animation has been carried over to the main modeling window. Dragging the Time pointer slowly back along the time line to the zero marker will also produce a series of bounding boxes showing the script is intact.

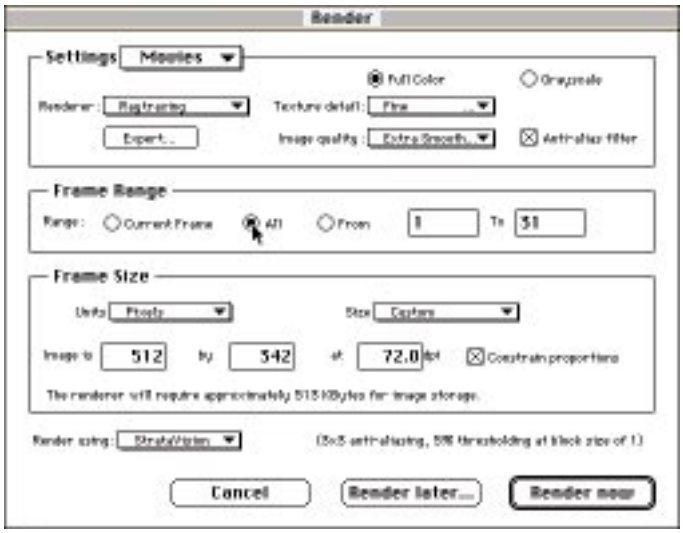


5. Render the animation.

Open the Render dialog and choose Movies in the Settings options. You must also tell the renderer to render all the frames by clicking the All radio button in the Frame Range option box.

Select rendering options according to your personal preference and hardware capabilities. When setting your rendering preferences you should keep in mind that each frame of the animation will be rendered in its entirety, which could take a very long time depending on the settings you select and your hardware. Therefore, you may want to start by selecting the Phong renderer with the Texture detail and Image quality fields set to Normal.

The settings indicated in this illustration will produce one of the highest quality renderings, but will take more time and memory to render.



Click Render Now when you are ready to start the rendering or click on the Render later button if you want to prepare the rendering file but wait to begin the rendering until a more opportune time.

HINT

Suspending a rendering is a good way to stay productive. This option allows you to put off the rendering process so you can continue working with a maximum of free RAM. You can then start the rendering and let the machine work during times when it would normally be idle. Overnight is a good time for queuing up several large rendering sequences. The Reference Manual contains more information on suspended renderings.

When you click Render Now, a dialog allowing you to name the animation file and set the format will appear. You can name the file anything you want.

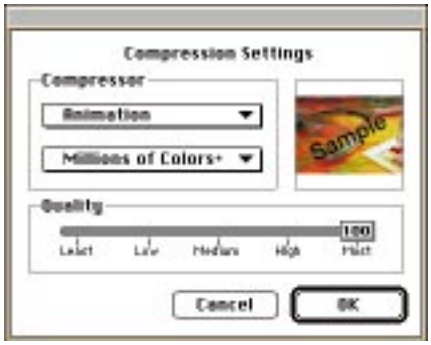
The File Format pull-down menu allows you to choose to save the animation sequence as a QuickTime™ movie or as PICS file. Each format has its own set of advantages and drawbacks. Both will work fine in Vision 3d, so your choice depends on your personal preference and ultimate use of the file. More information on these formats is presented in the Reference Manual.

For the purpose of this tutorial, save the animation as a QuickTime™ movie.

Click Save to continue, which evokes the Compression Settings dialog allowing you to change the compression method to match your needs. Detailed information on each of the compression methods is available in the Reference Manual.

Ensure the top Compressor field is set to Animation and adjust the bottom Compressor field to match you machine's capability.

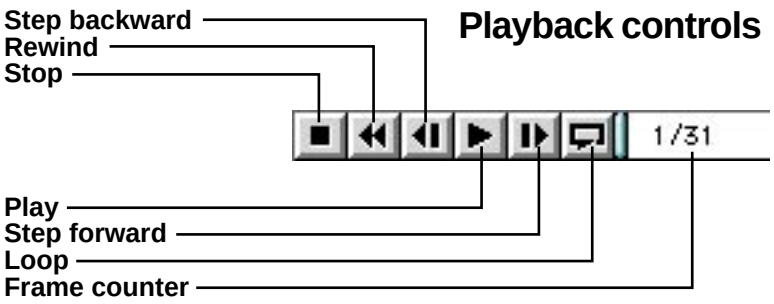
You can leave the Compressor fields at their default settings, However, they are set for maximum quality and may create an unexpectedly large file.



Leave the Quality slider set to Most and click OK to start the rendering.

Once the rendering begins, each frame will be rendered and appended to the last. The entire animation could take some time to complete depending on the options you have selected, so be patient.

If you want to get a rough estimate of how long the entire animation will take to render, simply time how long it takes for one frame to render and multiply that by the number of frames in the animation sequence. The important thing to remember here is that rendering a quality animation (or even a high quality snapshot) will take time. Patience and planning your rendering times for periods when you can dedicate your computer to the rendering task without interruptions will be important during long rendering sequences such as animations.



When the rendering is complete, a playback window will automatically open to allow you to watch your film clip.

All you have to do now is hit the play button and watch the magic.

For more information on animation rendering and playback options, please refer to the Reference Manual.

If you want to take the animation of your clock one more step toward reality, try animating the hands in the CLOCK BODY shape workspace. Remember, the center points of each hand was moved for more accurate placement and to prepare the hands for animation. Just be careful not to move them too far too fast or the realism of the script may be lost.

You have reached the end of this Getting Started tutorial. The techniques you have learned here will help you as you explore the endless possibilities of Vision's computer generated three-dimensional graphics.